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AFTER "BEING THROWN IN THE CLASSROOM": THE DEVELOPMENT OF PEDAGOGICAL SKILLS IN VETERAN ADJUNCT FACULTY TEACHING IN THE NATURAL SCIENCES

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By

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ABSTRACT

The postsecondary landscape has changed drastically in the past 40 years, with one of the most obvious changes being the increased reliance on adjunct or part-time faculty. Approximately 50% of the current faculty employed by postsecondary institutions are categorized as part-time faculty, up from approximately 25% in 1975 (American Association of University Professors, 2017; Snyder, de Bray, & Dillow, 2016). While there is literature surrounding the impacts of this phenomenon, the majority of studies are entrenched in a positivist framework, utilize quantitative methods, and many use large datasets to distill down whether students are more or less successful when taught by part-time faculty. Very few studies utilize the voices and examine the lived experiences of part-time faculty, especially in regards to how they develop their pedagogical skills as teachers.

A retrospective case study methodology was utilized to fill this gap in the literature. Seven part-time faculty members who teach in the natural sciences from various four-year institutions located in Southern New England were interviewed regarding their teaching experiences throughout their career, as well as their experiences with professional development through this time. The Novice to Expert Skill Model (Dreyfus & Dreyfus, 1980) was used as a theoretical framework. During analysis of the interview data, several key findings emerged.

Based on the experiences of the participants, part-time faculty teach fairly similarly to full-time faculty: They want to make science relevant to their students, teach using alternative teaching practices, and make personal connections with their students. It was also found that part-time faculty proceed along the Novice to Expert

Skill Model as it is described, with the exception of their beginning stage – many of the participants identified as more developed than the Novice stage when they began teaching. Several of the female participants showed a reluctance to admit they self-identified as Experts, while other participants were overly confident in their development. Participants identified peer interactions, self-drive, and funding as positive impacts to their pedagogical development. Participants identified "being thrown in the classroom" with no support, spotty observations by superiors, mechanical and forgettable workshops, and feeling like a "second-class citizen" as having a negative impact to the development of their pedagogical skills. Participant experiences point out a need for institutions and departments to recognize the motivations and needs of the adjunct faculty they have on staff currently, without making assumptions of adjunct faculty in general. Recommendations for institutional and departmental professional development policies are included.

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DEDICATION

Saying goodbye,
Why is it sad?
Makes us remember the good times we've had.

Thomas P. Shannon

Sept. 29, 1955 – Nov. 1, 2017

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CHAPTER 1

INTRODUCTION

My Background and Interest in the Topic

During the past 40 years, there have been major shifts in postsecondary education, with one of the most obvious being the increased reliance on adjunct faculty to teach at institutions of higher education. In 1975, 24% of all instructional staff were part-time employees (American Association of University Professors [AAUP], 2017). Adjunct faculty currently represent approximately 40% of all faculty in postsecondary education (AAUP, 2018). If we narrow it down further to look at a specific population, the number of part-time faculty that are currently teaching in the natural science at four-year institutions is approximately 25% (Snyder, de Bray, & Dillow, 2016). For the past 10 years, I have belonged to this very specific demographic – I have taught undergraduate introductory biology courses at two private four-year institutions as a part-time, adjunct faculty member.

I was a very young 24 years old when I entered my own classroom for the first time. I had previous experience as a graduate teaching assistant, but had never been responsible for my own class. I had grand notions of what it meant to be an effective teacher, yet I walked into that room and began lecturing, making sure that I covered the content. My student evaluations that term were dismal.

My department chair, however, saw something in me, first when she hired this very young graduate, just out of a master's program, to teach in her department, but also as I struggled through that first term – it would have been easy for her to just say, "Maybe this isn't the job for you." She instead guided me to professional

organizations like the National Association of Biology Teachers and the National Science Teachers Association, and encouraged me to read their journals. Because I was also hired as a staff member in her department, she managed to swing funding for me to attend teaching conferences, and within a few years I was presenting at those same conferences alongside her. She was an excellent mentor for a young professional. Eventually, I decided to head back to school to earn my doctorate in what I had become passionate about – teaching science.

My story is unique. Seeing and reading about the experiences of other adjunct faculty made me realize that there are not many adjunct faculty who have had an experience similar to mine, that many adjunct faculty are not exposed so early in their careers to pedagogy or guided by others to find resources on different teaching approaches. This led me to wonder, how do adjunct faculty in the natural sciences develop pedagogical skills, despite the lack of resources and support structures provided to these faculty? The following research questions were used to begin to investigate this larger question:

1. How do veteran adjunct faculty, who teach in the natural sciences, describe their teaching?
2. How do veteran adjunct faculty, who teach in the natural sciences, describe their development of pedagogical skills along the Dreyfus and Dreyfus (1980) Novice to Expert Skill Model?
3. How do veteran adjunct faculty, who teach in the natural sciences, self-identify their current stage of pedagogical skill along the Dreyfus and Dreyfus (1980) Novice to Expert skill model?

4. What do veteran adjunct faculty, who teach in the natural sciences, perceive as factors that provided positive results in their development of higher pedagogical skills?
5. What do veteran adjunct faculty, who teach in the natural sciences, perceive as factors that provided negative results in their development of higher pedagogical skills?

Originally in my proposal, research questions 2 and 3 were switched in order, but it felt more authentic during interviews, analysis, and the writing process to drive the discussion of development from when the adjuncts began teaching to where they are currently, rather than assessing where they self-identified currently and describing how they developed to get to their current stage.

Statement of the Problem

The primary focus of a part-time faculty member's work at an institution is teaching (U.S. Department of Education, 2012), and yet, the majority of part-time faculty are lacking in teaching experience, as many come from industry or are directly out of graduate school, looking for full-time employment (American Federation of Teachers [AFT], 2010). Similar to the majority of faculty at the postsecondary level, adjunct faculty have an excellent grasp of the content knowledge in their chosen field, but their pedagogical training can be lacking or even non-existent (Light, 1984). Professional development for faculty in the area of teaching/pedagogy is a constantly growing and changing field, but opportunities for adjunct faculty remain limited based on an institution's characteristics and culture. For example, the majority of the literature surrounding adjunct faculty professional development comes out of two-year

community colleges, where upwards of 70% of their faculty are part-time. Due to this high reliance, community colleges are more likely to recognize the need to support adjunct faculty, compared to four-year institutions where the percentages of adjunct faculty are smaller. As such, there is a major gap in understanding how adjunct faculty develop their pedagogical skills, especially in the natural sciences.

Producing college graduates in the fields of Science, Technology, Engineering and Mathematics (STEM) has become a national priority (Fayer, Lacey, & Watson, 2017; National Academies, 2010; Presidential Council of Advisors on Science and Technology [PCAST], 2012). It has been projected that the United States will need to produce one million more STEM graduates than will be produced at the current rate over the next decade to remain a global competitor in science and technology (PCAST, 2012). However, less than 40% of students who enter college intending on pursuing a STEM major persist in STEM until graduation (American Association for the Advancement of Science [AAAS], 2011; PCAST, 2012). The rate of attrition is higher for women, racial and ethnic minorities, students with disabilities, and students that come from weaker academic backgrounds (Chen, 2013; Xu, 2017).

At the same time, non-STEM majors are typically required to take at least one science course as part of their core or general education requirements for graduation. Students with degrees in a variety of fields are going to have an impact on scientific research and technological advances (National Research Council, 1999; AAAS, 2011, 2015). For many of our nation's future policy- and decision-makers, a low-level undergraduate science course is the last time they were required to think broadly about

STEM applications, and yet science intersects with their lives on a scale that they have difficulty imagining without help.

Science majors and non-majors alike are likely to be impacted by the overreliance on adjunct faculty. Adjunct faculty are typically used to teach science major introductory, gatekeeper courses (Eagan & Jaeger, 2008); those courses which students must succeed in before moving up to more complex and specific content courses (Tobias, 1990). Gatekeeper courses are a major focus of retention efforts, as they are typically the first major roadblock to many students, and if the roadblock is too difficult to pass, student will likely change their major and leave science altogether (Seymour, 2001). Adjunct faculty are also used to teach general education courses taken by non-major students, which are often the last science touchstone non-majors have within formal education. Understanding the development of pedagogical skills and the professional development that drives the development of those skills in adjunct faculty may help administrators to remediate low retention rates in gatekeeper courses and low student interest in general education courses.

Significance of the Study

The research is clear that no matter the discipline, incorporating active and collaborative learning approaches, as well as various teaching practices to encourage student engagement in the classroom, leads to better student learning outcomes (Chickering & Gamson, 1987; Kuh, 2007; Kuh, et al., 2005; Pascarllea & Terenzini, 2005). This has especially been true across STEM disciplines (Freeman et al., 2014) and within specific STEM disciplines (Prince, 2004; Ruiz-Primo, Briggs, Iverson, Talbot, & Shepard, 2011; Springer, Stanne, & Donovan, 1999). That being said, there

is a continuous assumption that most teachers in all disciplines in higher education are woefully unprepared in regards to their role as a teacher, have unsophisticated conceptions of teaching (e.g. that they are there to transmit information), and have little knowledge of effective teaching practices (Boyd & Harris, 2010; Evers et al., 2009; Hendricson et al., 2007) when they enter the profession. Many STEM teachers in higher education are also unwilling to make commitments to evidence-based teaching approaches, despite understanding their effectiveness, because of the time commitment necessary to properly learn and execute active and collaborative teaching practices (Henderson & Dancy, 2007; Sunal et al., 2001; Sunal & Hodges, 1997).

While there is a large reform movement regarding changing the way science is taught at the undergraduate level, much of that focus is geared toward full-time, tenure-track faculty. Part-time faculty face additional hurdles to adopting and implementing various instructional practices. At the same time, much of the research on adjunct faculty is limited to how effective they are compared to their full-time, tenure-track counterparts, and this research is firmly ensconced in the positivist framework, resulting in a multitude of quantitative studies that all have contradictory findings on that effectiveness in regards to retention rates (Chen, 2012; Deutsch, 2015; Eagan & Jaeger, 2008; Ehrenberg & Zhang, 2005; Harrington & Schibik, 2001; Ronco & Cahill, 2004), graduation rates (Deutsch, 2015; Ehrenberg & Zhang, 2005; Jacoby, 2006; Jaeger & Eagan, 2009), student GPA (Harrington & Schibik, 2001; Johnson, 2011; Ronco & Cahill, 2004; Rossol-Allison & Alleman Beyers, 2011), and individual course success (Bolge, 1995; Burgess & Samuels, 1999; Davis, Belcher, & McKitterick, 1985; Fedler, 1989; Landrum, 2009; MacArthur, 1999; Muller,

Mandernach, & Sanderson, 2013; Sonner, 2000). The studies that also focus on the instructional practices of adjunct faculty (Baldwin & Wawrzynski, 2011; Eagan, 2007; Leslie & Gappa, 2002; Schuetz, 2002; Umbach, 2007) are also large-scale and quantitative. While quantitative studies allow researchers to gain an important understanding of the large-scale picture of using part-time faculty and its impacts, some of the nuances regarding motivation for being an adjunct and what exactly their teaching looks like are overlooked. The studies often lump all full- and part-time faculty into one large category, without accounting for any differences in experience. There are very few research studies that employ a qualitative methodology and utilize the voices of adjunct faculty to describe their experiences at all, let alone as teachers, especially throughout their careers. Therefore, this study will use the stories and experiences of veteran adjunct faculty members who teach in the natural sciences to explore how those individuals developed their pedagogical skills throughout their careers. The results of this study will serve to create recommendations which inform departmental and institutional policies for professional development for adjunct faculty.

CHAPTER 2

REVIEW OF LITERATURE

The reliance on adjunct faculty has been a concern in the literature for decades – every study on adjunct instructors since the 1990s begins with a statement on the increased reliance of adjunct faculty and reviews the perceived benefits and drawbacks to their increasing presence in undergraduate classrooms. Much research focuses on the demographics of adjunct faculty and what their motivations are for becoming adjuncts in the first place (Bell, 2000; Callan, 1997; Donoughue, 2008; Gappa & Leslie, 1993; Jolley, Cross, & Bryant, 2014; Kezar & Maxey, 2014). Others highlight the benefits to bringing in adjunct faculty with industry or business experience (Bettinger & Long, 2010; McGuire, 1993; Wallin, 2004; Wickun & Stanley, 2011). There are many studies that focus on the impacts to student outcomes, like retention rates (Chen, 2012; Deutsch, 2015; Eagan & Jaeger, 2008; Ehrenberg & Zhang, 2005; Harrington & Schibik, 2001; Ronco & Cahill, 2004), graduation rates (Deutsch, 2015; Ehrenberg & Zhang, 2005; Jacoby, 2006; Jaeger & Eagan, 2009), student GPA (Harrington & Schibik, 2001; Johnson, 2011; Ronco & Cahill, 2004; Rossol-Allison & Alleman Beyers, 2011), and individual course success (Bolge, 1995; Burgess & Samuels, 1999; Davis, Belcher, & McKitterick, 1985; Fedler, 1989; Landrum, 2009; MacArthur, 1999; Muller, Mandernach, & Sanderson, 2013; Sonner, 2000). These studies indicate that there is concern that using adjunct faculty may not be as good of an idea in practice as it is on paper. There are a few studies that focus on how adjunct instructors teach, but most of these studies are secondary research from large-scale faculty surveys, rather than primary studies from the perspective of adjunct instructors

(Baldwin & Wawrzynski, 2011; Eagan, 2007; Leslie & Gappa, 2002; Schuetz, 2002; Umbach, 2007). We have very little knowledge at all as to how adjunct faculty develop their teaching skills and what forms of professional development they use to develop those skills.

In the following sections, I will introduce demographics and the motivations of adjunct faculty members, and explore the research surrounding the use of part-time faculty and its impacts on student outcomes. I will then summarize the literature surrounding the instructional differences of part-time versus full-time faculty and introduce the Dreyfus and Dreyfus (1980) model of skill development, which has been modified by Berliner (2004) for a focus on teaching skills. This model will serve as the theoretical framework for this research. The following two sections will focus on professional development for teaching, both in general, and to enhance the teaching skills of adjunct faculty at four-year institutions.

Understanding Adjunct Faculty

An adjunct faculty member is defined as one who identifies as contingent faculty, postdocs, teaching assistants, non-tenure-track faculty, part-timers, lecturers, instructors, or non-senate faculty (AAUP, 2003; 2006). For the purpose of this research, I use the terms adjunct faculty and part-time faculty interchangeably to refer to part-time instructors, paid on a per-course or hourly basis for their work.

In the past four decades, the postsecondary landscape has seen a dramatic shift in the composition of instructors and the positions they hold (AAUP, 2017; Snyder, et al., 2016). The AAUP estimates that the number of tenure and tenure-track faculty appointments has dropped from 45% of the total instructors to only 30%, while

contingent appointments (including non-tenure-track, adjunct, and graduate students) has soared to 70% of total appointments. Part-time appointments made up 40% of the instructors in higher education in 2015, up from 24% in 1975 (AAUP, 2017). Other sources of data have placed this number as high as 50% (Snyder, et al., 2016).

The shift is mostly due to the cost savings institutions gain by using contingent workers. AAUP (2017) reported that the average tenured professor nationwide earned $102,402 annually in the 2016-2017 academic year. In comparison, the average salary paid to adjunct faculty working at one institution was $20,508. Some individuals even reported being paid less than $1,000 a course as recently as 2013 in the Boston area (Adjunct Action, 2015). At the same time, only five percent of institutions offer all part-time faculty benefits, like health insurance, while 33 percent offer some of their part-time faculty benefits. In both cases, benefits are prorated based on less than full-time worked and any salary-based benefits, like retirement contributions, are lower because of the lower salary (AAUP, 2018). This is not to say that institutions are floundering financially – many of the largest increases in part-time employment occurred during times of relative economic stability. What is happening, though, is that institutions have been shifting their spending priorities from instruction to non-instruction expenditures, such as research funding, student academic services, and student services such as facilities and sports (Jacob, McCall, & Stange, 2018; Webber & Ehrenberg, 2010).

As a result, there are now two "classes" of faculty, the tenured "haves" and the temporary, part-time "have-nots," and this has been the case for nearly three decades (Bowen & Shuster, 1986). Because adjunct faculty are cheaper and help offset

undergraduate teaching loads, hiring them allows institutions to protect the research-heavy, more specialized tenure positions. Tenured faculty benefit from this situation, and as such have no vested interested in seeing it change (Gappa & Leslie, 1993). As a result, they do not always seek to incorporate adjunct faculty into the department culture, nor do they always support adjunct faculty when they seek to change the system or advocate for themselves, e.g. through collective bargaining.

Due to their part-time status, many adjunct instructors are disconnected from the campus community (Center for Community College Student Engagement [CCCSE] 2009). Forty percent of part-time faculty indicate they spend zero hours advising students (formally or informally), 47% indicate that they spend zero hours outside of class interacting with students, and nearly 80% spend zero hours participating in campus committees or task forces (CCCSE, 2009). The few studies that specifically address adjunct engagement identify similar feelings of being invisible on campus, very little connection with other members of the faculty and department heads (Bell, 2000), very little guidance in course and curriculum development, and lacking a "voice" within a department or on campus (Callan, 1997; Donoughue, 2008; Gappa & Leslie, 1993; Jolley, et al., 2014; Kezar & Maxey, 2014). Adjuncts are also limited on time, as many spend their time working for more than one institution to accumulate a reasonable salary, but then must spend additional time commuting back and forth between said institutions (Ethan & Seidel, 2013; Mueller, Mandernach, & Sanderson, 2013). Additionally, the only measure of adjuncts' teaching occurs during the student evaluation process, as many adjuncts report never having been evaluated by an outside observer (Jolley, et al., 2014; Kezar & Maxey,

2014). This is potentially problematic given that the validity of student evaluations of teaching tend to be biased against women (Boring, 2017; MacNell, Driscoll, & Hunt, 2017, Sprague & Massoni, 2005) and people of color (Reid, 2010) and are not particularly effective at measuring a teacher's effectiveness (Boring, Ottoboni, & Stark, 2016; Uttl, White, & Gonzalez, 2017).

Who are adjunct faculty?

Adjunct faculty in the popular press are typically painted with a broad brush that completely conceals the diversity of people who work part-time and what their motivations are for doing so. Countless articles posted by magazines and newspapers, describe the conditions under which some adjuncts live – some requiring food stamps to eat, others turning to sex work to supplement their meager incomes, and some even living out of their cars (Gee, 2017). Others describe the "frequent flyers," those adjuncts who work for multiple institutions and spend a good majority of their time commuting between campuses (Hall, 2015). Yes, these examples highlight the exploitation of adjunct faculty, but they do not present a representative view of all adjuncts and their motivations for working part-time. Nor do they represent why part-time faculty were utilized in the first place:

> The utopian view of adjunct professors is one of having highly educated, highly qualified, mentor-quality leaders who are also practicing professionals instructing the individual specialty in each college-level course. That is, they teach their subject matter of expertise in a highly specialized or focused class... These stellar part-timers bring the benefit of years of experience to the classroom thereby giving each student the best of both worlds. Additionally, it

> can be argued that adjuncts bring fresh faces and new ideas into the classrooms. In the end, it is the student who benefits the most. (Dedman & Pearch, 2004, p. 27).

Unfortunately, the utopian view is not how reality presents itself. Adjunct instructors typically fall into one of four main categories, as defined by the foundational work of Gappa and Leslie (1993): the career-enders; the specialists, experts or professionals; the freelancers; and the aspiring academics.

The first group of adjunct instructors are referred to as the *career-enders*. These individuals have typically held either a full-time appointment in higher education or in some industry outside of higher education, and have chosen teaching as an important part of their retired life. While traditionally they have made up a small percentage of the adjunct faculty workforce, their numbers are steadily increasing because of retiring baby boomers (Lyons, 2007). The second group of adjuncts are the *specialists, experts, or professionals*, faculty who maintain a full-time job and teach either discipline-specific or general education courses as a second job, mostly due to their love of teaching. It can include medical professionals and business people, and accounts for nearly 50% of the adjunct faculty workforce nationwide (Lyons, 2007). The third group are referred to as the *freelancers*, and include faculty for whom one of their many part-time roles is teaching in higher education. This group includes faculty who teach by choice and faculty who teach part-time due to other roles they play, such as parenting or caregiving. The freelancers make up the smallest percentage of the adjunct faculty workforce (Lyons, 2007).

The final group of adjunct instructors are the *aspiring academics*, faculty with terminal degrees or ABD doctoral students who are gaining experience teaching as they maneuver the job market to land a full-time faculty appointment. Monks (2009) reports that in 2004, 35%t of adjunct faculty appointments were held by those in this group, up from around 17%t in the early 1990s (Gappa & Leslie, 1993). However, this number may have increased in the past decade and a half given the consistent increases in doctoral degrees conferred and the unequal increases in full-time positions available for those newly minted doctorate degree holders (Snyder et al., 2016). It is this group of adjunct faculty who gains the most media attention (Lyons, 2007). They are also the most likely to participate in political activism in pursuit of better working conditions (Lyons, 2007).

While most adjunct faculty do have other occupations or obligations that prevent them from immersing themselves fully in the institutional culture (Lyons, 2007), it has been shown that approximately 30% of community college adjunct faculty report having worked for their current institutions for over 10 years (Leslie & Gappa, 2002), indicating a level of institutional loyalty that is sometimes overlooked by the institutions themselves. Meixner, Kruck and Madden (2010) also reported approximately 30% of adjuncts at a mid-size public university had worked there for more than 10 years. Institutions accept the narrative that adjunct faculty wish to remain weakly connected to their institutions, and because of logistical and economic difficulties barely attempt to institute programs that will help develop adjunct faculty teaching skills (Roeche, Roueche, & Milliron, 1995).

Impacts of Part-time Faculty on Student Outcomes

There has been a substantial amount of research in the learning and retention outcomes of students who are taught by predominately adjunct faculty versus those taught by full-time faculty (Bettinger & Long, 2010; Bolge, 1995; Burgess & Samuels, 1999; Chen, 2012; David, et al., 1985; Deutsch, 2015; Eagan & Jaeger, 2008; Ehrenberg & Zhang, 2005; Fedler, 1989; Harrington & Schibik, 2001; Jacoby, 2006; Jaeger & Eagan, 2009; Johnson, 2011; Landrum, 2009; MacArthur, 1999; McGuire, 1993; Muller, et al., 2013; Ronco & Cahill, 2004; Rossol-Allison, 2011; Sonner, 2000; Wallin, 2004; Wickun & Stanley, 2011). Despite an abundance of research, the impacts of using adjunct faculty remain unclear, as some studies report negative impacts in GPA, second-year retention, and graduation rates, while other studies show no impact compared to students taught by full-time faculty in some of these metrics, and some even report positive findings. This section of the literature review will summarize the reported advantages and disadvantages to utilizing adjunct faculty.

The one very clear benefit most reported in the literature is that adjuncts can bring professional experience into the classroom (Bettinger & Long, 2010; McGuire, 1993; Wallin, 2004; Wickun & Stanley, 2011). This is especially true in cases where the adjuncts are current professionals in the field or are career-enders who spent their previous careers in industry. In their research, Bettinger and Long (2010) found at a public, four-year college, students who take courses with older adjunct faculty (over the age of 40), are more likely to take subsequent courses in the major, especially in majors that are directly tied to a profession, such as education, engineering, and the

sciences. They attributed this to the fact that many older adjunct faculty have prior or concurrent industry experience that can be shared in their teaching. They also found younger adjunct faculty (under the age of 40), have a positive impact on students taking more courses in academic subjects, mainly attributed to their ability to focus on their teaching, rather than research. McGuire (1993) and Wallin (2004) both state that using professional adjunct faculty maintains ties with the local professional and business communities in the area of the institution. Wallin (2004) also suggests that practicing professionals bring a "real-world" component to their teaching, something that full-time faculty may be lacking from either many years out of industry or having never been in industry to begin their careers.

Where the literature begins to get a little unclear is when researchers focus on student outcomes, which was the focus of much of the research on adjunct faculty in the 1990s and 2000s. The following section will summarize the literature surrounding student retention, graduation/completion rates, individual course success, and student GPA.

Part-time faculty and student retention.

Harrington and Schibik (2001) focused their research on first-year freshman at a mid-size comprehensive university. They analyzed the fall to spring retention of four cohorts of students spanning four years. They reported that 47% of the overall cohort, on average, took at least half their coursework with adjunct faculty and almost 57% of those students were not retained to the spring semester. They found a significant relationship between a higher exposure to part-time faculty in the first semester of college and a lower retention rate in the second semester. Ronco and Cahill (2004)

reported that, while high school GPA and entering college having declared a major are more important indicators of retention at a public, research-intensive university, there was a significant effect in student retention when students took less than a quarter of their freshman year credits with full-time faculty. They showed an almost 14 percentage point drop in second-year retention for those students who took the vast majority of their freshman courses with part-time faculty or graduate student assistants. Ehrenberg and Zhang (2005), using nationwide data collected by the College Board, reported that an increase in exposure to part-time faculty by 10 percentage points results in a 0.5 percentage point reduction in first-year completion at public institutions. However, they reported that an increase in exposure to part-time faculty had no measurable impact on second-year retention at public institutions. Eagan and Jaeger (2008) studied the impact of instructor type in gatekeeper courses, those first- or second-semester courses required for either a major or general education, at four public universities. They reported for every percentage point increase in exposure to part-time faculty in gatekeeper courses, students became up to 37% less likely to be retained into the second year, even after controlling for key variables such as students' prior academic achievement and academic major. Because their study focused on gatekeeper courses, which typically have large enrollments and thus tend to suffer from poor pedagogical practices such as lecturing or failing to engage a large percentage of students (Seymour & Hewitt, 1997), Eagan and Jaeger postulate that the reduced retention in the second year is a result of part-time faculty being less accessible and less available to students outside of the classroom.

More recent research by Chen (2012) and Deutsch (2015) appears to show that part-time faculty have very little impact on retention rates. Chen (2012) analyzed national community college data from the National Center for Education Statistics' Integrated Postsecondary Education Data System (IPEDS) and Beginning Postsecondary Students (BPS). Through the IPEDS system, institutions are required to report on a number of variables, including ratio of part-time instructors and graduation rates. BPS follows a cohort of students that began postsecondary education in the 1995-6 academic year and followed them through 2001. Both sets of data allow for longitudinal tracking of students. Chen (2012) was most interested in what institutional-level characteristics of four-year institutions resulted in higher student dropout rates. He found no significant effect of the percentage of part-time faculty on student dropout rates. Deutsch (2015) also ran statistical analyses on first-year retention rates using IPEDS data from the fall 2004 to fall 2012 cohorts from more than 1,100 institutions. His results revealed no significant relationship between retention rates and the percentage of part-time faculty at an institution, even after separating the data into public versus private institutions.

As one can see, the quantitative research has been unclear as to whether retention rates are impacted by a student's exposure part-time faculty. When looked at from an institutional perspective, it appears exposure to part-time faculty does have an impact, but when looked at using higher level data, like nationwide surveys, there isn't as much of an impact.

Part-time faculty and graduation/completion rates.

Another typical measure of student success is graduation rates. Ehrenberg and Zhang (2005) utilized data from the College Board to analyze the impact of part-time faculty on graduation rates at four-year institutions. Their econometric analyses revealed that as the percentage of part-time faculty or more faculty on non-tenure track lines increased, there was a reduction in graduation rates. This was most prevalent at public institutions, compared to private institutions. They found that a 10 percentage point increase in part-time faculty resulted in a 2.65 percentage point reduction in graduation rate. They also found that the magnitude of the effects are largest at master's level institutions, where a 10 percentage point increase in part-time faculty results in a three percentage point reduction in undergraduate graduation rates. Ehrenberg and Zhang (2004) also reported that the College Board data did include some research on two-year institutions, but their analyses showed no impact of increasing part-time faculty on the graduation rates at two-year institutions. Jacoby (2006) developed a model using IPEDS data and found that the ratio of part-time faculty had a significant and negative impact on three separate measures of graduation rates of community college students nationwide, in direct contrast to the findings of Ehrenberg and Zhang (2004). Both of these studies used institutional data that may have simplified the relationship between other variables, such as student motivation and academic performance, which may also impact graduation rates.

Jaeger and Eagan (2009) combined institutional- and student-level data to report on associate's degree completion rates in the California community college system. Their statistical analysis showed that with every 10 percentage point increase

in exposure to part-time faculty, there was a one percentage point reduction in degree completion. While this may seem to be a small impact, the average student in their sample took 50% of their credit load with part-time faculty, resulting in a five percent decrease in degree completion rates. Of their total sample, 4.4% took their entire credit load with part-time faculty, which ultimately resulted in those students being 10% less likely to complete their degree. In contrast, Deutsch (2015) found that six-year graduation rates were not significantly impacted by the percentage of part-time faculty at an institution. He used IPEDS data from the freshman cohorts of 2001-2006 that represented more than 1,100 institutions.

Part-time faculty and individual course success.

There is limited research on individual course success, mostly because of the possible disparity between how part-time and full-time faculty grade, and that individual success is more likely determined by other variables, such as high-school GPA or standardized test scores. Fedler, Counts, and Stoner (1989) was one of the first studies to address this question and found that part-time journalism faculty at two universities in Florida and one university in Ohio were more likely to give higher grades than full-time faculty. MacArthur (1999) found that part-time community college humanities faculty were more likely to give higher grades than their full-time compatriots in their courses. Part-time faculty gave 42% of their students As, compared to 22% of the students enrolled in courses with full-time faculty over the course of three spring semesters. Sonner (2000) also reported that at a small public university, where 70% of the business courses were taught by part-time faculty, there was a significant difference between the grades given by part-time versus full-time

faculty, even after controlling for course size, discipline, and instructor degree. The most commonly held belief in the literature for this phenomenon is that part-time faculty members' jobs are reliant mostly on student evaluations, and as Greenwald and Gilmore (1997) report, low grades conversely impact positive student evaluations. Jacoby (2006) hypothesized that because part-time faculty are more likely to have lower course expectations and give higher grades, it explains why students who take introductory courses with part-time faculty are less likely to be successful in subsequent courses in a series taught by full-time faculty (Burgess & Samuels, 1999). This is in direct opposition to work by Mueller et al. (2013) on the success of students in an online course taught by both adjunct and full-time faculty. Both adjunct and full-time faculty were required to complete the same training before teaching online. They report that there is a significant difference in the final course grades, completion rate, and course satisfaction level between sections taught by adjunct and full-time faculty, where students were less likely to succeed and be satisfied in sections run by adjunct instructors. To make matters even more confusing, no effect on individual course success has been reported in the literature as well. Davis, Belcher, and McKitterick (1986) showed that student success in subsequent English courses was not impacted by the status of the professor in the prior course. Bolge (1995) also reported no significant differences in how much students studying introductory mathematics learned from part-time versus full-time faculty, based on pre- and post-test scores on a standardized state skills test. Landrum (2009) also found no significant differences between the grade distributions of part-time versus full-time faculty in undergraduate courses in the social sciences.

It appears that individual course success is also too variable to draw any meaningful conclusions about the impacts of using part-time faculty.

Part-time faculty and GPA.

There have been a few studies that have shown that a higher exposure to part-time faculty can impact the first-year GPA of students. Harrington and Schibik (2001) found that students at a mid-sized comprehensive university who took a higher percentage of their courses with part-time faculty were more than likely to be male, have lower SAT or ACT scores, and have lower first-year GPAs following the completion of the fall semester. Ronco and Cahill (2004) also found that students at a public, research-intensive university who took 50% or more of their credit hours with adjuncts had a slightly lower first-year GPA. Johnson (2011) presents a unique argument that the majority of studies that measure the impact of part-time faculty on student outcomes report statistical artifacts that result from aggregating data, typically into quartiles representing the percentage of classes taken with part-time faculty. Using a different statistical approach, Johnson reports that part-times faculty at a mid-size research university have no impact on second-year retention and also found that contingent faculty give higher grades than tenure/tenure-track faculty. While many studies had previously shown a negative impact on GPA, once Johnson accounted for high school GPA and ACT scores, there was no significant impact of contingent faculty on GPA. This takes into account research by Bettinger and Long (2005) which shows that students with high ACT scores and higher high school GPAs take more classes with tenure-track faculty, mostly because they are more likely to register for classes sooner and select course times that are more likely to be taught by tenure-track

faculty. Rossol-Allison and Alleman Beyers (2011) also reported a miniscule difference in enrollee success, which they attributed to higher-achieving students purposely taking courses with full-time faculty. The work of Bettinger and Long (2005) and Rossol-Allison and Alleman Beyers (2011) may help to contextualize the results of Harrington and Schibik (2001) and Ronco and Cahill (2004), both of which also showed a correlation between standardized test scores and first-year GPA.

As one can see, the actual impact of adjunct faculty on student outcomes is unclear given the contradictory results of these quantitative studies, but there is the potential for concern given some of the reported negative impacts on retention and graduation rates. However, these studies do not tell the whole story, as they do not reveal why the reliance on part-time faculty would cause a drop in retention or graduation rates, or have an impact on student GPA. From the numbers alone, we cannot tease out if it is the result of instructional differences between full- and part-time faculty, or if it is the result of more situational characteristics between full- and part-time faculty, where part-time faculty have less out-of-class meetings with students, less time available to students, and less peer connections. It also combines all full- and part-time faculty together, without accounting for differences in experience and training. The above studies set an important foundation, in that there may be differences in the outcomes of students if we continue to rely on part-time faculty for a high percentage of instruction, to open the door for more quantitative and qualitative research seeking to understand why that may be the case. This research seeks to examine the experiences of part-time faculty teaching and of their professional

development to begin to understand the nuances that may be lost using strictly quantitative data on student outcomes.

Instructional Practices of Part-time Faculty

Recent literature on adjunct faculty has focused more on the teaching practices of adjunct faculty compared to their full-time counterparts. There is less of a focus on individual student outcomes and more on whether the teaching practices used by faculty are effective in terms of student learning. The emphasis has shifted from focusing on their status as part-time faculty to the types of teaching approaches they use in the classroom, and if those approaches have been shown to be effective in the literature. The following section summarizes the research on the differences between the pedagogical approaches that full- and part-time faculty use in their classrooms.

Schuetz (2002) analyzed data on instructional practices of community college faculty nationwide using the 2000 Center for the Study of Community Colleges survey. She found no significant differences between the group means of part-time and full-time faculty, which suggested that overall, the two groups have a very similar use of class time – 45% of class time for lectures, 15% for class discussions, and 11% for quizzes and exams, with the rest of the time split between computer/internet usage, student presentations, media presentations, and field trips. The only significant difference in group means was in how often laboratory activities were used. That being said, they did find significant differences when they looked deeper into what faculty never do in the classroom. Part-timers are significantly more likely to never

use guest lecturers (75% of part-timers answered never, compared to 69% of full-timers), films or taped media (49% part-time versus 40% full-time), laboratory experiments (80% versus 69%), and computer/internet usage in class (61% versus 49%). She also reported that full-time faculty were three times more likely to use collaborative techniques, group activities, and teamwork assignments than part-time faculty. In terms of instructional activities outside of class, part-timers were less likely to have revised their syllabus in the past three years, less likely to have developed extracurricular activities for their students, and more likely to have spent no time planning for instruction on their most recent working day. Leslie and Gappa (2002) corroborated this data using the same dataset, as well as the National Survey of Postsecondary Faculty conducted in 1992–93 by the National Center for Education Statistics. They found similar results in both datasets. According to their analysis, although both full- and part-time faculty spent approximately the same amount of time in class lecturing, part-time faculty were less likely to use more "creative" teaching approaches in their classrooms.

Umbach (2007) utilized data from the Faculty Survey of Student Engagement, which was administered to 132 institutions in spring of 2004 to determine differences between the instructional practices of part-time and full-time faculty. He found that part-time faculty were significantly less likely to use active and collaborative strategies in the classroom, presented less of an academic challenge, and spent less time preparing for classes than their full-time counterparts. He did, however, find that part-time faculty in the social disciplines, like nursing, psychology, and education,

were more likely to use active and collaborative teaching practices (Chickering & Gamson, 1987) in their classrooms.

Baldwin and Wawrzynski (2011) analyzed the 2004 National Survey of Postsecondary Faculty. With over 9000 faculty at four-year institutions, they found that part-time faculty were more likely to use subject-centered activities, such as multiple choice exams, and were less likely to use learner-centered activities such as essay exams, group projects, written assignments with multiple drafts, and peer evaluation techniques. Eagan (2007) corroborated these results using the same data, and also found that part-time faculty were less likely to use technology in the classroom, including having a course website.

As part of developing a community of practice for the University of British Columbia's dentistry adjunct faculty, faculty (both full- and part-time) and graduate students were interviewed on their assessment and evaluation techniques (Webb, Wong, & Hubball, 2013). They found that the knowledge of evidence-based approaches for best educational practices to be low among not only adjunct faculty, but also full-time tenure-track faculty and graduate students.

As one can see, the research on how adjunct faculty teach in comparison to full-time faculty is limited, mostly to large-scale, nationwide surveys of teaching practices. At first glance, it appears that full- and part-time faculty teach in very similar ways, especially in regards to the time spent lecturing, having discussions and giving exams. However, the studies above do make mention that part-time faculty are less likely to engage in "more creative" (Leslie & Gappa, 2002) teaching practices, such as active and collaborative practices. There are also findings that suggest that

part-time faculty spend less time preparing and challenge their students less – all of which could lead to differences in student outcomes outlines above. But again, there is very little accounting for the differences in teaching experience and training among all of the part-time faculty being surveyed. This study seeks to allow part-time faculty to describe their teaching practices, specifically in the sciences, using their own words and describing their own goals for their courses and how they attempt to achieve those goals.

Theoretical Framework: Novice to Expert Model of Skill Development

Teaching is a skill that must be developed over time. Much like participating in sport or chess playing, developing the skills necessary to be an expert teacher requires years of practice and study (Berliner, 2004). Dreyfus and Dreyfus (1980) developed a model of skill development that extends from novice to expert and illustrates growth over the course of one's experience in a particular domain. There are five stages of development in the Dreyfus and Dreyfus (1980) model: Novice, Advanced Beginner, Competent, Proficient, and Expert. The Novice-to-Expert skill model has been used to explain the acquisition of knowledge and skills in a variety of contexts, including clinical medical education (Batalden, Leach, Swing, Dreyfus & Dreyfus, 2002; Carraccio, Benson, Nixon & Derstine, 2008; Green et al., 2009; Swing et al., 2013) and nursing (Benner, 2004). Adapted and expanded upon for teaching by Berliner (2004), the characteristics of the five stages can be seen in summary in Appendix X.

In the novice stage, the task environment is typically decomposed into context-free features that can be recognized without the desired skill, and then very specific rules are followed when those features are encountered (Dreyfus, 2004). For example,

a novice manual transmission driver will be taught to shift up to second gear when the speedometer reaches 10. While this works most of the time, it will not work when the context changes, such as driving up a hill. In a teaching context, a novice teacher is typically bounded by rules that are context-free, such as "give praise for correct answers" or "wait at least three seconds after asking a higher order question" (Berliner, 2004, pg. 206). Novice teachers are fairly inflexible because of those rules, only seeing things in black and white when making decisions. In a K-12 context, student teachers and first-year teachers are often novices (Berliner, 2004).

As learners move into the advanced beginner stage, they start to have some expanded context and experience that helps them see that rules have exceptions, but are still challenged when faced with novel difficult situations. The manual transmission driver will use engine sounds as well as the established rules to determine when to shift gears (Dreyfus, 2004). In education, this is where the verbal knowledge taught in education programs melds with the situational knowledge gained through experience. Most second- and third-year teachers fall into this category of skill development. While they begin to feel more comfortable, when novel situations arise, like the first time a student challenges authority or tries to monopolize the teacher's attention, they are unsure how to proceed until they have experienced it a few times. Case knowledge, or the learning that happens in those kinds of situations, is practical knowledge developed mainly during this stage – it is ultimately the knowledge experts rely upon later in their careers (Berliner, 2004). There is some evidence that some teachers never develop past the advanced beginner stage (Borko et al. 1992; Eisenhart & Jones, 1992).

As learners gain more case knowledge and experience, they become overwhelmed and begin to wonder how they will ever master the skill. They begin to develop their own set of rules for situations they have experienced, most of which are tempered by the context in which they are learning, and thus are inappropriate for novice and advanced beginners. Because they can regulate part of their context, competence is experienced by practitioners who recognize when to attend to a situation and when to ignore another based on their contextual experience. The competent driver leaves the highway and regulates their actions based on speed, but the situational characteristics, like surface conditions, severity of the curve, etc., require them to quickly analyze the best course of action – either to hit the brakes or continue accelerating (Dreyfus, 2004). Competent teachers make conscious decisions about what they are going to do by making their own plans and setting realistic goals. Becoming competent can be frightening to the learner, because prior to this stage, they can write off unsuccessful situations as not having adequate training and experience, or not having learned enough of the rules. Because competence is characterized in people that have chosen their own set of rules, they feel ultimately responsible when a situation goes awry and they still struggle when faced with unfamiliar situations. As such, they are not very fast, fluid, or flexible in their decision making. If teachers reach competence, it typically occurs within the third to fifth year of teaching (Berliner, 2004). It is also at this stage where emotional attachment may play a very important role in further skill development. Benner (1984) found that with nurses, the more emotionally invested they were, both in the joy of a job well done and the remorse felt when a situation went awry, the more likely they were to progress to later

stages of skill development. The nurses who remained within the safety of their own rules were less likely to progress forward and more likely to burn out trying to figure out all of the possible rules and maxims presented by a career in medicine. This may help to explain the retention issues of new teachers in the K-12 context– many do not last more than five years (Ingersoll, 2003; Sutcher, Darling-Hammond, & Carver-Thomas, 2016).

As one becomes more emotionally attached to their career, it becomes more and more difficult to resort back to the inflexible rules that they themselves have developed. Using both positive and negative emotional experiences and allowing for the anxiety of choice, proficient practitioners can set forth plans that are the obvious outcome, rather than the result of a complex set of deliberations. The proficient driver approaches the curve just as the competent one, but is more likely to react faster and will be more likely to navigate the curve successfully (Dreyfus, 2004). Teachers are considered proficient when they respond with situational intuition that has been built upon years of case knowledge and experiences, being able to predict when a classroom situation may go awry. Proficient teachers, however, still take time to deliberate when making decisions. Proficiency is typically not seen before the fifth year of teaching (Berliner, 2004).

Expertise is achieved when all of the situational experiences encountered by that person coalesce into a reference that they can intuitively pull from. Decisions are immediate – the car driver approaching the curve quickly pulls their foot from the accelerator and applies the correct pressure to the brake with zero thought (Dreyfus, 2004). Another example of expertise can be seen in expert chess masters, who

typically play games at five to-10 seconds a turn, navigating more than 100,000 possible scenarios with very little deliberation (Dreyfus, 2004). Expert teachers function as effortlessly as possible, using their intuition and knowledge from thousands of hours of teaching to deal with situations as they appear. Expert teachers are still deliberate when something doesn't work out in the classroom, but very rarely reflect when things go smoothly. They operate from a deep understanding of the total situation. It is generally regarded that it takes approximately 10 years or 10,000 hours of practicing a skill in a particular domain to reach expert level (Berliner, 2004).

Developing expertise in teaching, however, requires more than just reflection and experience. Bereiter and Scardamalia (1993) suggest that teachers must continuously engage in self-regulating their learning about teaching in order to develop expertise. Experts, they claim, continuously seek out opportunities to further their understanding of problems, and as a result develop even more effective ways of problem-solving, as opposed to non-experts who resort to routine based on experience. Kreber (2002) describes the difference between an excellent teacher and an expert teacher as *where* their knowledge of teaching is derived from. An excellent teacher will develop and modify their skills based on experience only – what works and doesn't work in their particular context. An expert teacher develops their expertise not only through experience, but draws in knowledge from outside resources on teaching specifically – using the educational literature and pedagogical models developed by others to inform their practice.

One of the main focuses of this research study is to determine if the novice-to expert skill model can be used to describe the skill development, not of traditional K-

12 teachers, but of adjunct faculty members, many of whom have entered into the teaching profession through a wholly untraditional way. Many of the participants in this study may be considered experts in their own careers, and as such, one wonders if prior expertise or even prior development of other skills can impact teaching skill development.

Teaching Professional Development

For the purposes of this research, teaching professional development (TPD) is defined as "programs and activities meant to foster faculty member engagement in any individual or social activity, reflection, or learning about teaching or learning with the goal to improve one's own or other's teaching knowledge or practice" (Bouwma-Gearhart, 2008, pg. 5). This is to distinguish TPD from faculty development and professional development, in that the two latter terms often include a focus on the whole professional life of faculty, including research, content, and service professional development. TPD narrows the focus to those activities that focus solely on teaching.

Faculty development has gone through many changes in focus throughout history. The first recognized instance of faculty development was sabbatical leave, which was first instituted at Harvard University in 1810 (Lewis, 1996). From that point until the 1960s, the major focus of faculty development was on scholarly work and research expertise (Ouellett, 2010). Sorcinelli and colleagues (2006) then identified five major stages in the history of postsecondary faculty development, with the first being in the 1950s and -60s as the Age of the Scholar. During this time, very few institutions had any resources for faculty interested in improving their teaching (Ouellett, 2010), as the overarching perception at the time was that teaching skills

improved as one's scholarship increased (Heiss, 1970). The second stage spanned the mid-1960s through the 1970s and is considered the Age of the Teacher. During this time period, faculty began to become dissatisfied with the lack of resources in regards to teaching (Ouellett, 2010). During this time, teaching improvement programs included "one-shot" workshops, sometimes called expert centers, where veteran faculty could advise colleagues in return for release time and financial incentive programs. Faculty received small grants or sabbaticals to engage in teaching improvement projects. The 1980s brought in the Age of the Developer, which was a time where institutions began to formally create faculty development positions and centers on campus (Sorcinelli et al., 2006). The 1990s were the Age of the Learner, where the focus shifted more to how students learn, rather than how teachers teach, which led to innovations in student-centered, active, and collaborative learning (Sorcinell et al., 2006). During this time, faculty development programs evolved quickly to become comprehensive, institution-wide programs that served the large diversity of faculty (Ouellett, 2010). It has been proposed by Sorcinelli and colleagues (2006) that we are now in the Age of the Networker, where faculty development centers are being called upon by institutions to work with faculty, staff and administrators to solve institutional problems.

TPD can take many different forms. Weimer and Lenze (1994) identified five categories of postsecondary TPD. They have been ranked in importance by full-time STEM faculty in a study by Bouwma-Gearhart (2008) as: workshops, seminars, or courses; consultation of teaching resource material, either paper or electronic; colleague-to-colleague mentoring; consultations with individuals at education centers

or education “experts”; and grants/sabbaticals for working on teaching curriculum/instruction. Despite a large amount of research into the effectiveness of workshops, seminars, courses, and colleague-to-colleague mentoring (in the form of mentoring partnerships and learning communities), there is less research on the importance of the other types of TPD, even though consultation of teaching resource material may be the most common form of TPD practiced (Sunal et al., 2001). It is also important to note that, while this list has been created and ranked by full-time faculty, part-time adjunct instructors may not have access to these same types of TPD.

Four major reviews of the higher education TPD literature have been conducted. Levinson-Rose and Menges (1981) reviewed 71 studies from the 1960s to the 1980s and found that, while the majority of respondents had participated in workshops and seminars, typically “one-shot” meetings, those opportunities of TPD were the least likely to produce changes in faculty approaches to teaching. Steinert and colleagues (2006) reviewed TPD specifically in the medical sciences and found that it was difficult to “tease out” what makes teaching development effective. Preliminary findings suggest the importance of peers and feedback, as well as the importance of multiple methods of instruction. Stes and colleagues (2010) reviewed 36 studies between 1977 and 2007 and found weak evidence that development activities of longer duration resulted in positive learning outcomes at the faculty level. They also found that course-length interventions had more positive learning outcomes for students. Amundsen and Wilson (2012) reviewed the development literature using a slightly different lens, ultimately clustering together TPD that was more similar to allow for more accurate reporting of effectiveness. They also found that despite there

being a consistent body of literature cited in TPD studies, it did not appear that many studies were built upon the results of previous work.

TPD for Adjunct Faculty

Research on adjunct TPD is lacking, especially within the STEM disciplines and at four-year institutions. Much of the research focuses on professional development at two-year public community colleges, as they employ some of the largest percentages of part-time faculty, upwards of 70% (Snyder et al., 2016). Four-year institutions, especially research institutions, are more likely to focus their professional development attention on other cohorts of faculty, such as new and junior faculty, graduate teaching assistants, and even midcareer and senior faculty (Lambert & Cox, 2007).

It has been recommended by the Center for Community College Student Engagement (2009) that part-time faculty be offered professional development, not only to enhance their teaching strategies, but to learn about the institution structure and mission (Easton, 2009), which will ultimately facilitate student success. Baron-Nixon (2007) lists key opportunities for professional development that may help to make part-time faculty feel more a part of their teaching communities. These characteristics include: scheduling development workshops at various times during the day, not just during the daytime hours, to allow part-time faculty the opportunity to attend; providing information about grants and fellowships that may not be well-publicized; participation in scholarly forums where faculty can share scholarly activities and accomplishments; access to institutional funding for teaching improvements; access to professional development to increase technology usage;

invitations to submit original scholarly work in institutional publications; access to funding to attend conferences and pedagogical seminars; and tuition discounts for educational programs pursued at the institution. Jaeger and Eagan (2011) have shown a positive correlation between the percentage of non-tenure-track faculty (of which adjuncts were included) and student retention, when all faculty at an institution are provided support and training. That being said, there are very few opportunities for adjunct faculty to interact, share their experiences, and be exposed to and embrace current pedagogical advances within their program or institution (Lydon & King, 2009).

Schuetz (2002) reported on the instructional practices of community college instructors nationwide and, as a part of the survey used, asked questions regarding professional development. Among full-time faculty, 85% responded that they intended to pursue professional development in the next year, compared to 76% of part-time faculty. Full-time faculty were more likely to engage in behaviors that indicated they would follow through in pursuing professional development, such as joining membership organizations and attending meetings or conferences related to those organizations. It is also important to note that not all institutions allow adjuncts to participate in workshops or seminars, colleague-to-colleague mentoring can vary on a wide range of implementation (Boyle & Boice, 1998; Zellers, Howard & Barcic, 2008), and sabbaticals are typically unavailable to part-time faculty. Another consideration is time – most adjunct faculty have at least two jobs and must balance any development between a typical workload and commuting (Ethan & Seidel, 2013; Mueller et al., 2013).

There have been a few studies that have focused on the success of specific programs implemented by four-year institutions to increase TPD opportunities for adjunct faculty. The following section summarize those studies, organized by the type of program: online workshops, orientation programs, and long-term teaching programs or communities of practice.

Quite possibly the easiest approach to TPD for adjunct instructors is instituting online opportunities for TPD. One of the largest obstacles to implementing any type of professional development for adjunct faculty is the accessibility to the faculty, as many are only on campus for the short periods they teach each week. Using asynchronous online workshops can allow adjunct faculty to use resources they may not be able to access on campus. Yee (2007) describes such a course developed for adjunct and other teaching faculty at the University of Central Florida that can serve as a touchpoint for adjunct instructors to review as necessary. The course was designed with several stand-alone modules on pedagogy that can be started and stopped at any time, but included many hyperlinks and resources that provided several layers of additional information. Instructors were given access to the course indefinitely, so they could refer back as necessary.

Another common approach to TPD for adjunct faculty is to offer orientation or onboarding workshops at the beginning of the year. Key features of orientation workshops for part-time faculty include: ample opportunities for the adjunct to become familiar with the mission and values of the institution; acquainting the adjunct with the policies and procedures they must follow; assisting adjunct faculty members in developing departmental relationships; providing opportunities for mentorship;

establishing reliable means of communication; and providing the basic instructional tools the adjunct will need in the classroom (Smith & Wright, 2000). While most of these orientations focus on the myriad of operational concerns of a new faculty member, such as how to utilize email, learning management systems, and an overview of academic support departments, some have begun to include talks and workshops on teaching. Yee (2007) describes one such orientation for adjunct faculty members at the University of Central Florida that takes place in the form of an eight-hour retreat on a Saturday. One-third of the day is spent on administrative matters; the other two-thirds focus on pedagogical topics. Part-time faculty are awarded a stipend for attending the day's events. Renninger, Holliday and Carter (2007) describe an orientation developed at Shepherd University to support incoming adjunct faculty members after retention and graduation rates declined following a change in the institution's mission statement and classification (college to university). They offered the one-day session on several days to allow adjuncts the ability to attend at least one. They also polled the adjunct faculty to determine what information would be useful to include in a new faculty guidebook designed to take care of some of the operational information without using up people's time. Schwartz (2007) describes his personal experiences with an Instructor Effectiveness Training provided by one of the institutions he worked for when he began teaching. He took a face-to-face course over the course of four Sunday mornings, where he connected with other adjunct faculty and had the opportunity to reflect quickly on his experience in education and how to reach students with all sorts of learning styles and approaches.

There have also been examples of intensive term- or year-long programs that have been successful. The University of Connecticut recognized the need to centralize their TPD for adjunct instructors teaching at their regional campuses (Barker & Mercier, 2007). Adjunct instructors were nominated by campus heads to participate in the program, resulting in a group of adjuncts committed to learning to be better teachers. As such, they have had great success in the program. The program involves adjunct faculty being committed to traveling to the main UCONN campus, meeting with instructional designers on making pedagogical changes to their courses, implementing projects that enhance their own pedagogical practices and incorporate more technological applications to their courses, and a comprehensive evaluation of the course design at the end of the program. Adjunct instructors who complete the program then return to their regional home campus and serve as a teaching resource associate to the other adjunct faculty on campus. One such adjunct made note that having the teaching resource associates offer workshops has strengthened the social structure of the adjunct community on campus.

Miami University, known in the TPD literature for their use of Faculty Learning Communities (FLC), opened up a "FLC-lite" program to part-time faculty (Lambert & Cox, 2007). The program did not demand the intense commitment the full-time FLCs required, but did provide several workshops mandatory for participation, as well as a $200 stipend to spend on pedagogical materials. After the first year, when only five participants completed the program, the researchers began to gather information on what part-time faculty were looking for in terms of TPD, which included a stronger community tie and a strong focus on teaching in higher education.

The University decided to open up some of its typical FLC offerings to part-time faculty if they were interested and revamped the FLC-lite to focus even more on teaching. Webb, Wong, and Hubball (2013) also reported on the success of communities of practice for professional practitioners hired as adjunct faculty members to teach for the University of British Columbia programs of dentistry and education. Both programs offered flexible communities of practice that focused intensively on evidence-based instructional practices and assessment techniques. While the researchers found it was difficult to ensure participation, and most of the adjunct faculty continued to relate to their chosen professions more than they did as instructors, the researchers also found that instructional practices changed to more student-centered teaching techniques and there were better learner outcomes based on assessment portfolios produced as part of the program.

TPD opportunities specifically for part-time faculty at four-year institutions are few and far between, so it appears that, in many cases, adjuncts are responsible for their own professional development, as described by Maria Durso (2011), which also appears to be the case for full-time faculty as well (Sherer, Shea and Kristensen, 2003; Sunal et al., 2001). Durso (2011), an Adjunct Instructor of English at Park University, reflects on her experience developing skills in the scholarship of teaching and learning as she began her part-time career. She was encouraged to read books and articles describing best practices and the accomplishments of her colleagues by the administration. By the end of her reflection, it is clear that the majority of Durso's development was of her own doing – her ability to self-reflect allowed her to change her practices and convert her classroom to a learner-centered space. However, she

states in her reflection, that simply being exposed to materials is not enough; there needs to be encouragement to develop teaching skills. Durso's (2011) reflections regarding part-time faculty and professional development also highlight one point that is very clear in the literature: Part-time faculty members are motivated to work primarily for their desire to teach, and many are motivated to become better teachers. Further, 57% of part-time faculty in the profession teach not for the money, but simply because they enjoy teaching (AFT, 2010). Meixner et al. (2010) noted that, despite very clear concerns about difficulties keeping students engaged, maximizing learning experiences, and dealing with underprepared students, the overarching emotions regarding these concerns involved "love, passion, and appreciation for teaching and engaging with university students" (p. 145).

What is missing from the literature is what types of TPD adjunct faculty at four-year institutions perceive they have access to and prefer to utilize as their skills develop. Very little, if any, of the research cited amplifies adjunct faculty voices – most research comes from an evaluation perspective to determine if a particular program is successful, not by asking adjunct faculty how their teaching skills developed over time or what TPD they have participated in and found effective at enhancing their practice. This research study focuses on this issue not from an evaluator standpoint, but from the perspective of the individual adjunct faculty interviewed.

CHAPTER 3

METHODOLOGY

Post-positivism and Qualitative Research

This research was influenced by the post-positivist paradigm. Post-positivism upholds the belief of an absolute truth, but that the absolute truth is unattainable due to flawed human intellectual mechanisms (Lincoln & Guba, 1994). The evidence presented by research is always "imperfect and fallible," (Creswell, 2009, pg. 7). Post-positivists abandon the dualism of the positivists, but still maintain a sense of objectivity in which the researcher remains separate from the analysis (Lincoln & Guba, 1994). Post-positivist research focuses on how well current findings fit with the existing knowledge of a topic (Lincoln & Guba, 1994), while also reflecting the needs to assess causes that influence outcomes (Creswell, 2009). Post-positivism usually applies an etic, or outsider, approach. When an etic method is employed, a key feature is that observations are made across different settings in a parallel manner (Morris, Leung, Ames, & Lickle, 1999). At the same time, emic viewpoints may be solicited to "assist in determining the meaning and purposes that people ascribe to their actions," (Lincoln & Guba, 1994).

Post-positivism usually employs a quantitative approach, but when appropriate, a qualitative approach can also be utilized. Qualitative researchers are interested in understanding how people make sense of their world and their experiences in the world (Merriam, 2001). Qualitative post-positivism can be used to overlay a participants experience over an existing theory to determine if that theory can be used to explain the participant's experiences. The constant-comparative method

(Glaser & Strauss, 1967) of data analysis is a commonly used approach within the paradigm of post-positivism (Lincoln & Guba, 1994).

A large portion of qualitative research is directed at problems within professional practice. Findings can be generalizable to other settings and therefore are informative for decision-makers in those other settings (Stevenson, 2004). As revealed in Chapters 1 and 2, policies surrounding the use of adjunct instructors and their institutional support systems are typically employed in a very superficial, quantitative manner, utilizing a positivist, dualist framework – not accounting for the complexities of the experiences of all adjunct instructors. However, one distinctive problem of the post-positivist paradigm being utilized in qualitative research is that "findings do not translate into unambiguous prescriptions or blueprints for action to be followed mechanically by" decision-makers (Stevenson, 20040, pg. 46). The need to include a "rich, thick description" (Geertz, 1973) in a qualitative study is then imperative to allow decision-makers as much information as possible to interpret the findings in light of the circumstances by which they are found, "providing readers good raw material for their own generalizing" (Stake, 1995, p. 102).

This study employed a retrospective qualitative multiple case study methodology to answer the following research questions:

1. How do veteran adjunct faculty (five or more years of teaching), who teach in the natural sciences, describe their teaching?
2. How do veteran adjunct faculty, who teach in the natural sciences, describe their development of pedagogical skills along the Dreyfus and Dreyfus (1980) Novice to Expert Skill Model?

3. How do veteran adjunct faculty, who teach in the natural sciences, self-identify their current stage of pedagogical skill along the Dreyfus and Dreyfus (1980) Novice to Expert skill model?
4. What do veteran adjunct faculty, who teach in the natural sciences, perceive as factors that provided positive results in their development of higher pedagogical skills?
5. What do veteran adjunct faculty, who teach in the natural sciences, perceive as factors that provided negative results in their development of higher pedagogical skills?

For the purposes of this research the term "pedagogical skills" is defined by the skills listed in the Novice-to-Expert Skill model (Berliner, 2004), including teaching approaches and strategies, and teaching using more equitable or inclusive pedagogy (Adams & Love, 2009). Participant experiences were analyzed through the lens of the Novice-to-Expert Skill model by Dreyfus and Dreyfus (1980) and how their experiences "caused" positive and/or negative growth along the model, utilizing a predominantly etic perspective. The exception to this was in Research Question #1, where participants' responses about how they describe their teaching were analyzed more from the emic perspective, or the insider perspective, utilizing their own words to describe their teaching.

The study followed all University of Rhode Island IRB Guidelines. There was a minimal risk to the participants, as the subjects were not part of a population traditionally at risk. Every effort was made to ensure the confidentiality of participant identities, with each participant being given a unique numeric code on all

documentation. Participant consent forms were stored and organized in a separate, locked private file, so a connection cannot be made between participant identities and transcripts. Pseudonyms have been used in reporting the results.

Case-Study Methodology

Case study methodology was chosen based on the following considerations as described by Yin (2014): (a) the focus of the study is on "how" or "why" questions; (b) the researcher cannot manipulate the behavior of the participants in the study; (c) the researcher wants to cover the contextual conditions because it is felt they are relevant to the study of the case; and (d) the boundaries are not clear between the phenomenon and the context.

Yin (2014) defines the scope of a case study as "an empirical inquiry that investigates a contemporary phenomenon in depth and within its real-world context" (p. 16). Stake (2013) uses the term quintain to describe this phenomenon; it is the object or condition to be studied. The quintain contains the individual cases that share a common characteristic or condition and are somehow categorically bound together. In this research, the quintain is adjunct pedagogical development and is comprised of individual adjunct instructor experiences as the cases. In a multiple-case study, the individual cases are studied for their similarities and differences in order to understand the quintain. Yin's (2014) holistic multiple case study selection process embodies the post-positivistic paradigm, as cases are selected based on whether similar or contradictory results are expected for predicted reasons.

Each adjunct faculty member's experience is different, but they all inform the target of the study – adjunct pedagogical development. The boundaries between the

quintain, adjunct professional development, and the contexts in which the individual faculty experience the quintain are difficult to parse out. For example, each individual adjunct faculty member is offered different experiences in terms of professional development because of institutional or departmental culture, and these experiences shape the development of their pedagogical skills.

One of the major pitfalls of case study methodology is asking questions that are too broad or have too many objectives (Baxter & Jack, 2008). Both Yin (2014) and Stake (1995) suggest placing boundaries to determine what is not part of the case. The boundaries set in this research are in regards to the types of institutions adjunct faculty have taught at and characteristics of the adjuncts themselves. The first boundary identified was that the adjunct faculty members interviewed should have at least five years of experience teaching, as the purpose of this study was to investigate the development of pedagogical skills, and time would certainly need to be a consideration. The second boundary identified was in regard to prior education. As the study focus was designed to look at the development of pedagogical skills in adjunct instructors as a result of their experiences as adjunct instructors, I did not want to cloud the results with the experiences of adjunct instructors with prior formal education in pedagogy. As such, adjunct faculty with conferred degrees in education (at the bachelor, master, or doctoral level), as well as those with K-12 certification, to account for alternative pathways of certification, were excluded from the intended sample. The third boundary imposed on the sample was that I wanted to focus on the experiences of adjunct faculty who have taught the majority of their courses at four-year institutions. The bulk of the literature on adjunct faculty is focused on community

colleges (Meixner et al., 2010), mostly because of their reliance on part-time faculty. As adjunct faculty make up a lesser percentage of the total faculty at four-year institutions, institutions may have a different approach to supporting their professional development than two-year institutions. However, I did not exclude adjunct faculty who currently or previously have taught for two-year institutions. The final boundary imposed was that I did not include current graduate students who we classified as adjunct faculty for the institutions they were attending for their studies, as there is typically a different culture surrounding graduate student pedagogical support.

Sample

The participants for this study were selected using a purposive sampling method (Creswell, 2012). A snowball approach was attempted, but due to the constraints of the intended sample, none of the participants were identified because of their relationship to another participant. The participants in this study are part-time faculty members, who predominantly teach natural science courses (biology, chemistry, physics, environmental science, nutrition or general science) at four-year institutions.

Once I received IRB approval, emails (see Appendix B) were sent out to department chairs at four-year institutions throughout southern New England (Rhode Island, Massachusetts, and Connecticut). Various social media outlets (see Appendix C) with a higher-education focus were also identified as potential recruitment avenues. Potential participants were directed to complete a short survey (see Appendix D) that was included in the initial communications to vet interested participants and ensure they fit within the boundaries of the quintain. The survey was completed through a

Google Forms survey that was password protected and no names were collected through the survey. Once a participant was identified, I contacted them via email to schedule an in-person interview. Each potential participant was evaluated following the three main criteria for selecting cases as outlined by Stake (2013): if the case was relevant to the quintain, if the case provided diversity across contexts (such as discipline, gender, stage of life, etc.), and if the case provided good opportunities to learn about complexities and context.

I contacted 86 department chairs at 39 four-year colleges and universities in the northeastern United States via email. Four social media pages were also contacted and allowed me to place a recruitment post on their pages. Of the 22 individuals who responded to the short survey provided in the recruitment emails and posts, nine fit all of the required criteria (five-plus years of teaching experience, the majority at four-year institutions, no K-12 certification, no formal education degree, and not a graduate student at the institution(s) where they teach). Of the nine, seven responded to further communication and were interviewed in person. All of the participants in the study had responded to the survey through the recruitment emails sent to department chairs, and as such, were all geographically located in southern New England. A summary of their demographic information can be seen in Table 1.

Of the seven participants interviewed, five identified as female and two as male. All of the participants identified as white, and one identified explicitly as Jewish.

Table 1: *Study Participant Summary Characteristics*

Pseudonym	**Gender Identity**	**Ethnicity**	**Science discipline**	**Adjunct Categorization (Leslie and Gappa, 1993)**
Natasha	Female	White	Biology	Freelancer
Sofia	Female	White	Environmental Science	Career ender
Rachel	Female	White	Biology	Freelancer
Malcolm	Male	White	Chemistry Earth Science	Career ender
Philip	Male	White	Chemistry	Career ender
Wanda	Female	White, Jewish	Nutrition	Freelancer/Professional
Melinda	Female	White	Chemistry Physics	Freelancer

Data Collection

The primary source of data was semi-structured interviews with the participants. Interviews were chosen to allow for the adjunct faculty voices to be utilized in the analysis, as well as to highlight nuances between individuals. "Interviews are necessary when we cannot observe behavior, feelings, or how people interpret the world around them. It is also necessary to interview when we are interested in past events that are impossible to replicate" (Merriam, 2001, p.72). Using a semi-structured format for the interview assumes that each individual defines the world in their own unique way (Merriam, 2001). While there was a highly structured portion of the interview designed to obtain very specific information, the majority of the interview questions were not as strictly worded and did not occur in a specific order. This allowed for "the research to respond to the situation at hand, to the emerging worldview of the respondent, and to new ideas on the topic" (Merriam, 2001, p. 74). The first part of the interview focused on each faculty member's background, including questions about discipline, education, teaching experience, and

identity, followed by questions about the courses they teach, what teaching approaches they utilized when they started teaching, and how their pedagogical skills have developed over their career as an adjunct, including what resources were available to them. Faculty were also provided with the Novice to Expert skill model (Dreyfus & Dreyfus, 1980) and were asked to identify which stage they identified with when they began teaching and where they feel their stage of teaching development resides currently. The semi-structured interview protocol used for this study can be reviewed in Appendix E.

Case studies typically examine complex phenomena where multiple variables impact the outcome of a single or small number of data points. As a result, multiple sources of evidence are used to triangulate the data (Yin, 2014). Additional sources of data that were used for triangulation included classroom documents, such as course syllabi, when they were made available by the participant. These documents served as a permanent record of the evolution of an instructor's teaching approach, and were helpful in triangulating the data collected in interviews. I also reviewed the mission statements and strategic plans of each institution identified by my participants in order to determine the underlying approach to professional development at each institution.

Data Analysis

Data analysis in qualitative research begins while collecting data. There is an iterative process of collecting data and immediately analyzing the data that serves to focus the remaining data collected (Merriam, 2001). For example, questions asked in the first interview may be modified to ensure that subsequent interviews result in the correct data. After each interview was transcribed, I began to construct categories or

themes that emerged from the data using the constant-comparative method of data analysis developed by Glaser and Straus (1967). While developed for grounded theory research, it is commonly used in case study research as it "is compatible with the inductive, concept-building orientation of all qualitative research" (Merriam, 2001, p. 159). While reading the first faculty interview transcript, I took notes in the margins, made comments and observations, and asked questions; anything that may have been relevant to my research questions. This first round of coding highlights the most remarkable pieces of the data, some of which may be the most important to developing themes (LeCompte, Preissle, & Tesch, 1993).

After working through the first interview transcript in the above manner, I began to group notes and comments that were similar or might fit together in the same theme. After this stage of analysis, I created a memo that included all of my initial themes and groupings. Keeping this category list in mind, I annotated the second interview as described above, and then compared those notes to the constructed list of categories and merged the themes together. This process continued until all of the data was analyzed and a complete master list of themes was created. Using this master list (see Appendix F), all of the data was re-analyzed to organize units of data that fit within each category (Merriam, 2001). As the analysis process is iterative, even after re-coding, the final findings required some additional reorganization from the master list of themes during the writing process – as such, the master list is not the final organization of the themes in this dissertation.

The end product of case study research "is an intensive, holistic description and analysis of a single instance, phenomenon, or social unit" (Merriam, 1988, p. 21).

A rich, thick, descriptive narrative of each of the cases was developed from the data collected. As is essential in multiple-case analysis, similarities and differences were then identified across cases, in a cross-case analysis. It was important that the cross-case analysis not only focused on the commonalities among cases, but highlighted any case that has unusual features that caused it to stand out amongst the cases, typically due in part to context (Stake 2013).

Trustworthiness

To ensure the trustworthiness of my research, I considered the four criteria described by Guba (1981): credibility, transferability, dependability, and confirmability. A brief checklist accounting for all of these criteria can be found in Appendix G. To ensure credibility of the data and analysis, I used triangulation by collecting multiple sources of data, peer scrutiny using critical friends who are familiar with my background and with my research focus, and member checking with subjects during and after analysis to ensure their experiences had not been manipulated in any way. Participants were emailed a shortened version of the master list of themes that omitted some findings that may have been distressing or caused harm or anxiety to my participants. For example, I omitted the sub-theme in Research Question #3 that suggest that some participants identified as expert, but my analysis indicated that some may not have been experts. The findings summary that was sent out to participants can be seen in Appendix H. Three of the seven participants responded indicating that they were content with my findings and even added their commentary on a few items.

While most findings in qualitative research are relevant to only a small number of individuals or environments, each group is a member of a broader group, and as

such, transferability between individuals should be accounted for. To account for transferability, a thick description of the phenomenon has been included in the analysis. Also, purposive sampling was employed to choose unique cases that may be similar to other contexts (other institutions). Dependability of a qualitative study is closely tied with credibility, but ensures that the study could be repeated by another researcher. An in-depth methodological description is key to allowing other researchers insight into how the study was conducted, as well as the keeping of reflective journals and extensive documentation throughout the data collection and data analysis portions of the research. The final criteria to ensure trustworthiness in a qualitative study is confirmability, or the assurance that the findings are the result of the experiences and ideas of the informants, not of the researcher. The best way to ensure confirmability is to be upfront about my personal experiences and biases in regards to my research focus, including a detailed admission of my own personal experiences, beliefs, and assumptions (Shenton 2004).

Personal reflection

The nature of qualitative research requires the use of researcher-as-instrument, and as such, can result in personal biases introduced in the analysis. I am an adjunct faculty member in the natural sciences who has had my own set of experiences developing my pedagogical skills, so I bring my own perspectives to the research. It is these experiences and perspectives that have shaped my research question and interview protocols. However, because each individual's reality is constructed by their own experiences, I must attempt to set aside my experiences while questioning participants and analyzing the data. The following reflection will utilize the lens of the

Novice-to-Expert Skill Model by Dreyfus and Dreyfus (1980) modified by Berliner (2004) for teachers to analyze my own personal experience in developing pedagogical skills and the factors that had a positive and negative impacts on my development.

I have been an adjunct instructor in biology and general science for 10 years, having been hired as one right out of my Master's in Oceanography program at 24 years old. I have always self-identified as an aspiring academic adjunct, hoping to use my teaching experience as a springboard into a full-time academic position.

In retrospect, I would identify as an advanced beginner in the very first course where I was the instructor of record. I had a couple of years of experience in teaching as a graduate student, and even more years of experience as an undergraduate tutor before that. The most defining characteristic that makes me identify as an advanced beginner was being "Unable to see the entirety of a new situation (may miss some critical details)" (see Appendix A for the Novice to Expert Skill Model (Dreyfus & Dreyfus, 1980)). I spent the majority of my first term lecturing to a classroom of culinary majors as if they were science majors. I did not recognize the difference until about halfway through that term. I quickly progressed to the competent stage the next academic year, as I developed a very rigid set of rules that took up a page of my syllabus. It was the way I could keep control when I felt unconfident in my abilities as a teacher, as I could always point to the syllabus and use it as an excuse when I didn't want confrontation. It would be several years before I feel like I progressed to level of proficient and it was mostly tempered by experience with different types of learners, like adult learners taking online classes, where I realized my rigid rules could not be applied to people who worked 70 hours a week or had sick kids. I became far more

flexible and loosened up as an instructor. I also began to see the bigger picture of what I was teaching – I taught mainly non-majors students, so it wasn't so important to focus so intently on the details, but on the scientific process as a whole. At this point in my career, I hover between proficient and expert, depending on the teaching situation and how confident I am in that classroom. However, based on Kreber's definition of an expert teacher – as one who uses both experience and outside resources to develop their pedagogical skills – I would easily self-identify as an expert teacher.

As such, professional development has almost always been an important part of developing my skills as a teacher. The most influential professional development early on in my career was an informal mentorship that I developed with my department chair at the time. She was, as I have now experienced working for other supervisors, a very hands-on, involved chair, who observed adjuncts and gave excellent feedback, incorporated simple professional development presentations into her department meetings, and participated in a slew of external professional development activities herself – attending conferences, running workshops, and encouraging her faculty to follow along with her. She encouraged me to join professional organizations, like the National Science Teachers Association and National Association of Biology Teachers, so that I could subscribe to their teaching journals. During my first and second years as a teacher, I spent a lot of my free time exploring different teaching strategies published in those journals and researching online for other ways of teaching. A good portion of my professional development in subsequent years was self-directed, with participation in conference and workshops

mixed in. I was also lucky to be employed as a staff member of the department as well, which afforded me a desk in the office the faculty shared and hundreds of informal conversations with faculty of all different disciplines to add to my development. I began taking coursework towards an education doctorate and it was at that point that I diverge from the participants in my study, as I have been formally trained in educational theories, practices, and policies – all of which have played a major role in the development of my pedagogical skills.

CHAPTER 4

FINDINGS

I begin this chapter with detailed descriptions of all of the participants, including their education and career history, as well as a classification into one of the four categories of adjunct faculty as described by Leslie and Gappa (1993). The remainder of the chapter will be organized by research questions, with evidence that supports each question.

Participants

Natasha. Natasha is a white, female, part-time faculty member currently working for a small liberal arts university in New England, where she teaches primarily biology and general science courses. She has a master's degree in cell and molecular biology, and worked in research and development and sales for pharmaceutical companies before teaching. Natasha has worked for three different institutions in the 12 years that she has been an adjunct. She began working at an all-women's university, where a friend of a friend told her about the position. She taught introductory biology and wellness courses there. She has also taught at a local community college, where she taught introductory biology. At both her current institution and the community college, she had union representation. I have decided to classify her as a *freelancer*, mostly because of her motivation in becoming an adjunct had to do more with flexibility to spend time with her family, which consists of a husband and two children. She could also be classified as an *aspiring academic*, although her lack of terminal degree has pigeonholed her into part-time positions, as many full-time positions now require terminal degree status for consideration.

However, she has no inclination to join the tenure track, as she has no desire to conduct original research.

Sofia. Sofia is a white, female, part-time faculty member who currently teaches environmental biology at a small, private, Catholic institution in New England. She has a master's degree in environmental engineering and a PhD in oceanography. She spent the majority of her career working as a soft money (grant-funded) research faculty member at a top oceanographic institute in New England, where she was an ecosystem ecologist. During that time, she advised a handful of graduate students as the major professor or a member of master's and doctoral committees. She also worked closely with a STEM outreach program that paired actual research scientists with K-8 teachers to advance elementary and middle school STEM education. She attributes many of her teaching skills to this work, as she had close relationships with education faculty and picked up tips and techniques from the workshops that she has modified for her teaching. She did not start teaching until about 12 years ago, when she began co-teaching a continuing education course at a comprehensive state university. She did spend a few years working as a full-time lab instructor for her current institution, but quit full-time because it was more time than she was willing to work. The institution later called her to teach environmental biology, which she has been teaching for six years. Sofia is classified as a *career-ender,* as she did not begin teaching until her first career as a research scientist ended.

Rachel. Rachel is a white, female, part-time faculty member who currently teaches biology courses at a small, private Catholic institution in New England. She has a PhD in molecular virology, but opted to stay home with her small children until

they started school, as her lack of income was of no consequence to her family. She has been teaching as an adjunct for 15 years, also holding a part-time position at a small, liberal arts university early on in her teaching career. Her PhD has served her well as an adjunct, as she has developed a virology course at the institution where she works. She teaches both majors and non-majors. Majors normally take her virology course, whereas she teaches human biology and a microbiology course for non-majors. She has, for one or two terms, held a non-tenure track full-time position, but only because there was a need for her to teach more than a part-time teaching load. She is classified as a *freelancer*, as many times in her interview she emphasized her family as her number-one priority over her teaching – for example, she mentioned taking a term off because her family was moving and that she couldn't teach afternoon labs because her kids would be home.

Malcolm. Malcolm is a white, male, part-time faculty member who teaches earth science and chemistry at a small, private religious institution in New England. He has a master's degree and worked as a microbiologist and chemist in industry and for public health initiatives in New England. He stumbled upon an ad for teaching at his current institution when he was helping his youngest child find a job after she finished college. He has been teaching both online and in the classroom for 13 years, teaching mostly non-major science electives like chemistry in society and earth science. Malcolm is classified as a *career-ender*, as teaching has been a secondary career now that he has retired from industry.

Philip. Philip is a white, male, part-time faculty member who teaches chemistry at two institutions, a community college and a comprehensive state

university, both in New England. He has his master's degree in chemistry, and is ABD for his doctorate degree in chemistry. While he was a graduate student, he taught a lot of lab sections, as well as a lab recitation, as he was one of the few people with English as a first language teaching the labs. When he opted out of his doctoral program, he began working in industry as a chemist, where he was involved in safety and machine instruction. He worked a few times as a sabbatical replacement at a few local institutions, but it wasn't until about five years ago, when he was laid off from his job, that he began teaching regularly. He actually works "full-time" by working for the two institutions, both of which offer union representation. He teaches several different levels of chemistry, including general chemistry, organic chemistry and analytical chemistry. Philip would be classified as a *career-ender*, using teaching to fill in the gap between a long-term career and retirement.

Wanda. Wanda is a white, Jewish, female, part-time member who currently works for two different business schools in New England. She has a master's degree in nutrition science and is a registered dietitian. She taught a little straight out of graduate school, but also worked as a dietitian for WIC and for some hospitals. She has taught at numerous college and universities in New England for the past 17 years. She currently teaches nutrition and a course called Health and Disease to non-major students as electives. Wanda is classified as a *freelancer* because her husband has a full-time job with benefits, and she made mention of raising her family during her career.

Melinda. Melinda is a white, female, part-time faculty member who teaches physical science courses for a small, liberal arts college in New England. She has a

master's degree in mechanical engineering. She spent the first part of her career in industry, where she worked long hours and traveled overseas often. When she decided to start a family, she quit the corporate world and decided to start teaching as a flexible job. She was offered a job teaching high school, but the schedule did not work for her family, which was her ultimate priority. She began working at her current institution six years ago, teaching algebra and merchandising math for fashion majors. She switched from the math department to the science department the next year, where she began teaching physics, a modern science and technology course designed for non-majors, and a science for educators course designed for elementary education students. Melinda is classified as a *freelancer* as she prioritizes her family over her job and is currently seeking out ways to make more money that fits with her schedule.

Findings

The following sections present evidence to support each of the research questions individually. Each participant's interview was analyzed to develop themes around how they described themselves as teachers, how they described their development along the Novice to Expert Skill Model (Dreyfus & Dreyfus, 1980), how they described their current stage of development along the skill model, and the positive and negative factors they perceived during their development.

Research question #1

Research question #1: *How do veteran adjunct faculty, who teach in the natural sciences, describe their teaching?* This question was designed to act as a baseline – if I was going to ask questions regarding the development of pedagogical skills in veteran, adjunct, science faculty, I needed to have a good idea of how they

saw themselves as teachers, both when they began and throughout their careers. Participants were asked to describe their first and current teaching experiences in detail, using interview questions that guided their responses, many along the lines of asking them to tell stories and experiences. Participants were also asked several times about what an effective teacher looks like, or what an ineffective teacher looked like. From their responses, three major themes presented themselves that describe how the participants teach: 1) science should be relevant to the students in the classroom; 2) science should be engaging, and they teaching using a variety of teaching practices; and 3) they develop personal connections with their students. During the interviews, participants were asked questions reflecting on their past and current teaching, as well as what they think effective and ineffective instructors look like. Overwhelmingly, the participants responded that teaching in the sciences should be relevant and engaging, while also prioritizing developing personal connections with their students.

Making science relevant

All of the participants have been responsible for teaching non-majors science courses at some point in their careers, and as a result, recognize the need for science to be accessible to all students in all of their classes, non-majors and majors alike. Those experiences made it very clear to them that part of being an effective teacher is to make sure that students can access science at a level that is appropriate. This is a common concern of students themselves, and in many cases, science being irrelevant to their lives is a reason they decided not to pursue further science education in their postsecondary careers. Pike and Dunne (2011) interviewed students in the United Kingdom who had chosen not to pursue science after compulsory education. An

example of a student response: "…it was just so irrelevant to what…to my whole life and to what I would be doing. None of it was going to help me pay the bills and things like that. I just…didn't see the relevance of it really I just went off it…" (pg. 494). Similarly, all of the participants in this study made mention of making their particular brand of science relevant for their college-aged students.

Relevance was referred to in several ways, from using small real-world analogies to explain difficult concepts, to using current events and situations relevant to the students' lives to illustrate concepts in action, to focusing the main goal of their courses in a way to enhance critical thinking skills to develop scientifically literate and consumer-conscious students when they exit the class.

Simple real-world analogies

Rachel, Philip, and Malcolm all described simple examples of analogies that they use to teach difficult concepts. An analogy can be defined as, "a comparison of two otherwise unlike things based on resemblance of a particular aspect," (Merriam-Webster, 2018). Analogies have been consistently used in many disciplines, including science, as a way to facilitate the construction of knowledge. The constructivist view of education (von Glaserfeld, 1983; Whittrock, 1985) has remained one of the leading theoretical perspectives on how learning in science occurs, and is based on two tenets: 1) learning is actively constructed and 2) learning is only possible if based on previously constructed knowledge. As a result, learning occurs when students examine the similarities between the new and what they already know – hence the extensive use of analogies by teachers who employ constructivist practices, especially in non-majors courses (Dult, 1991; Coll, 2015; Glynn, 2015; Seiler, & Huggins, 2018).

Rachel described a good example of an analogy that included popular culture:

> I teach about prion disease so I think that prions are like the Transformer toys really transform this thing you don't take any pieces away you don't add any pieces but you go from a bird to robot so you just change the way it's folded.

As a result, she says, "I get a real kick out of reading their papers and seeing my words come back….Transformers are in every answer and I just think that it's so interesting watching that connection." Malcolm also gave an example of using an analogy in his earth science class that students could refer back to, and its success:

> They actually like it. I mean, I'll say, "Okay. A cinder cone volcano. An infamous one is called Puu Oo, so how am I gonna get them to remember that?" I say, "Hey, have any of you ever eaten a pu pu platter?" Now, six or eight of them had. I showed them it has this thing in the center with flames shooting out of it. Nobody answered it wrong on the exam.

Philip had an example of an analogy based in the real world to help students understand concepts. Because he teaches chemistry, Philip uses "a lot of cooking examples because that's what people use….That's what people use chemistry for." One such example he described using in a job interview teaching demonstration: "I did one on limiting reactants and I used the example of loaves of bread and slices of meat and pieces of cheese and how many sandwiches [someone could make]." Years later, he ran into someone who had seen that teaching demo and they related to him that "You were a really good teacher. I remember that lecture you gave me on the sandwiches."

All of these examples take sometimes extremely complex science concepts and make them a little more approachable to the students by focusing on the similarities to concepts they already know and can access in their knowledge base.

Current events and students' lives

The majority of responses that referenced making their classes relevant to students referred to using current events and topics that would eventually impact the students' lives. Natasha details this when she described how she approaches teaching in her general science course for non-majors:

> I sort of went off the approach of the 25,000 foot view of a lot of different scientific disciplines. So but then do they have anything that you can all have in common? So I would talk about climate change, I would talk maybe about physics and the content of space and you know, interesting things like that, not just physics. I would talk about, you know, like, genetics. I would talk about designer babies and GMOs and maybe targeted gene therapy medications, things that a non-scientist would encounter in their lifetime. So, yeah. I mean, I would say that it was a little different in that I don't think it was as specific, I wasn't looking for actual processes so much as was like, here's the scientific methodology between technology and here are some societal issues. Sometimes it's more interesting to teach. Interesting in the sense of making your classroom more dynamic.

Being a trained geneticist, Natasha focused on the topics she was passionate about, like targeted gene therapy, designer babies, and GMOs, but all of which the students had either heard of, or had experience with in their own lives, like eating a bag of

chips with a Non-GMO Project Verified label. She also went on to describe how she incorporates real-world examples into her majors anatomy and physiology courses, despite the content being a little less exciting than what she teaches in her general science course:

> I think some of the best classes that I have, even now that I have, are the societal impact of our discipline, so even in A&P - the side-tracked ones, I think talking about drugs, for example, right, so physiologically what they do to you and why. And then is marijuana really polarizing from a native standpoint, right, or is it the political stuff that makes it polarizing? Right, and so, I think some of my best classes are where you can extrapolate, like evidence is evidence, right? And we're humans and their philosophical approach to things are what complicate things, not the evidence itself.

Sofia, when asked in what context she felt most satisfied teaching, responded saying that she loves teaching her environmental biology course "because it's the topic that I feel is so little known by the general public, I teach non-science majors now but I feel it's so important that they understand ecology and the effects of humans, huge populations on ecology." An example of an assignment she gives in class that ties into the lives of students is detailed below:

> For instance, we did an exercise on food waste and they had to keep a diary on food waste and then we related that to the fact that, the scientific fact that, food waste causes a huge amount of greenhouse gases. It's one of the bigger things so it's something they can do….Environmental science can be negative

> because of the problems we have, so I try to keep it on the positive side. So they can see that they can do something about problems.

Melinda incorporates research projects that tie into her non-majors students' actual majors, stating:

> We do a research project that I ask them to try to do based on their major, and science, in [that] there's science in every major, and I just feel like when they do that, I feel like they benefit a little bit more about science because they're learning about it in their area.

From these research projects, Melinda actually took an idea that her students kept choosing as a topic, 3D printing, and began to incorporate it permanently into her non-majors modern science course:

> And these are topics, like 3D printing, it pops [up] in my non-majors classes all the time, like students choose it as a topic. So it's something that's really cool and interesting, I think, that they can engage with and see it and see the applications for it and you may not think it's actually science…. I'm like, yes it is science…. Now we're incorporating 3D printing in it. So I've actually taught myself how to do modeling for that and then I teach them how to do it and then they actually go and see it 3D printed so they kind of will get into it. And then we talk about all these cool technologies that's coming out with 3D printing.

Early on in his career, Philip taught a six-hour environmental chemistry course on Saturdays, where the majority of the students were local firemen. Knowing that he needed to make the course engaging and relevant, he developed the course's lab manual so that "one of the experiments was we made wine, and similar things to that,

recycling type things, and stuff that would hold their interest." Philip continues to use relevant cooking chemistry examples throughout his courses, including why we use salt when cooking pasta:

> Does adding salt to water really make the boiling point higher? Not really. Well what it does is yeah, it raises the temperature half a degree Fahrenheit. Tablespoon of water will raise a gallon of water half a degree Fahrenheit, which is not enough to make a difference but what it does is it makes the pasta taste better. And examples like that. If you can get to an example that they are familiar with then you can make them remember it. At least a little better.

Rachel also describes a simple example that she uses in her human biology course, stating, "You know, I do the skin, I tell them where they put the ink for tattoos. I try to find the things that are relevant to their lives."

All of the examples above provide connections to what students already know and have experienced to help to build scaffolds for new knowledge to be created, much like the analogies describe above, but focusing on much larger-scaled concepts.

Critical thinking skills

Taking real-world applications to the next level, some of the participants described how their goal was not just to use relevant examples in class, but make sure the skills students learn, like critical thinking skills, could be applied outside the classroom. Critical thinking skills are defined as the capability to think reflexively and to judge information thoughtfully, so as to decide if said information is reliable and to determine what action one should take based on said information (Ennis, 2002; Gut, 2011). Improving critical thinking skills is a common learning outcome in most

science courses, but only some instructors make that their main focus, as evidenced in this study.

Melinda defines her classes by this process, stating, “I think that's what the science classes are supposed to be. It's more about applying the reasoning process and teaching you how to reason with it.” As a way to teach students how to use the reasoning process, she makes sure she illustrates and scaffolds those skills in her classrooms:

> I always ask them, what do you know, for instance, about magnets? And then they come up with one or two things. I'm like, there's more. So they really think about it. And sometimes I can do some demos, and they really think about it. And so there's always, whatever facts I give them, I always tell them, don't believe in facts that you hear. You have to somehow validate it. So that's where they do the experiments…. One really cool thing that I do is I give them a golf ball and a ping pong and we'll do [an experiment] about gravity. And I'm like, so what if you think, if you drop same height, what do you think will fall first? And they all make their prediction, and they actually do it. I don't tell them the answer. They do it, and they come up with their own conclusion. So a lot of it is more of like, what did you notice, versus me telling you. So that's a lot about what we learn in class, don't believe what you hear. You need to validate what you learned in class.

Wanda has also made critical thinking the main goal of her non-majors nutrition courses, stating:

> So I think I've become a better teacher, and in the last, I don't know, maybe five years or so, I've decided it's extremely important to teach students critical thinking. So even though I've always had information on the scientific method and the importance of it, at the beginning of the semester I have now expounded, enlarged that.

Rachel wants her students to learn information in her classes that can be used outside the classroom, things that they will remember later on in life if necessary. She describes an assignment in which students research a microbe and use relevant sources, and then gives them a real-life problem they might have one day:

> Just so they get out in the world and if they need information they go to the right place. I teach my micro class about the travel clinic when they go around world. I take the CDC website and I open it up and say, "Okay, if you want to go to Costa Rica on spring break, what vaccines do you need? You can't go to your pediatrician anymore." So I try to teach them things that they can use outside of the classroom. I think that's good and one of my goals that they find it relevant to their lives and that they take away information that they can use. I don't want to fill them up with facts that they're going to forget. And I mean, personally I thought about what I remembered from my political science classes when I was in college and I don't remember that much. So how much could I really expect for them to remember long-term? So I can't expect them to go out of here and remember all the facts. But many of them remember where to find those facts that they need and make the CDC website.

Rachel, Wanda, and Melinda all described examples of how they train students to use critical thinking skills in their everyday lives, mostly through trying to encourage their students to be more consumer-conscious, meaning they understand what advertisements and news articles are actually saying about products they use in their everyday lives. Wanda was especially tenacious about this concept, incorporating it into her daily classroom activities:

> They sign up for current events and we start off every class with something that they've found. It can be something that sounds ridiculous, but they bring it in and we assess it for, was this a study? Is this a product that you would buy? Is this a reputable source? Where was it published? How long was the study done? Was it double-blind, placebo-controlled? Are we talking absolutely risk, relative risk? Is somebody just trying to sell you something? And they're amazing. They go to Science News or Daily, or whatever, and bring in those kinds of things. But sometimes somebody'll bring in some outlandish advertisement, which is perfectly fine because this is what they see as consumers. If they're going to be healthcare consumers, they need to know how to ask.

Rachel also uses advertisements of products that are “clinically proven” to help students see how science can be used outside the classroom, having her students

> ...go find an ad for anything that says clinically proven. Or laboratory tested. Does it meet this criteria? So just letting them become a more savvy consumer. So all those things I think are valuable traits and maybe even to like science or like some aspect of it.

Melinda incorporates these critical thinking skills into making major purchasing decisions, including when purchasing a car:

> For instance I talk about energy, and then I sort of go into like there's so many different car types, you can buy like hybrid, don't just go to a car manufacturer and say oh, I should just buy a hybrid. Do your own analysis and don't believe what you hear….They're trying to sell you something, it may be true, it may not be true, if you know your situation, and I try to teach them how to do that, how to apply it, so there's a lot of that.

Wanda also wants her students to be a little more conscious of medical decisions that they make, stating:

> In my Health and Disease class, if students can ask their doctors, "What kind of test are we doing? What are the recommendations?" If they can decide whether or not they can be a watchful waiter, or if they are the kind of patient that has to have everything. If I can give them the skills to start thinking that…then I've had an effect….If they can use one or two of those down the road, yeah. And the one or two that I would want is the absolute versus relative risk, is being able to ask, "What kind of difference will this test make?" Because you shouldn't have a test unless you're going to do something with the results, and if you're not going to do anything with the results, don't have the test.

In all of these examples, the instructor's focus was less on the content – like with Rachel, she could describe the necessary vaccine someone need when they visit somewhere like Southeast Asia and why they are needed because of the specific

diseases that are endemic to that region – instead, the instructors focus more on how and where to find the information the students need to answer their own questions, and how to accurately judge the quality of the material at hand, giving them skills that they can turn around and use in their own lives.

A few of the participants described instances of how they knew they were being effective or ineffective based on the use of relevant example in science. Rachel, when asked for an example of a time she felt like an effective teacher, described:

> I had a student say to me, we had done reproduction and he said that a woman who was pregnant got pregnant again and I had just told them how you stop ovulating and it's so you can't get pregnant and hormone levels and turns back and he said, "And they had it on the news! Cause it was weird." And that, that to me is really exciting when they say they make the connection to something in the news or outside of class and they bring it in for me, to share or something like that. I really like that.

Wanda also described a situation where her students engaged in the material outside of class, in response to a question about what her goals are as a teacher:

> I had some students tell me that ... At [private business school], one from each class, they were at a party on a Saturday night. And they were talking about my class. You know how students say to you, "Is this gonna be on the exam?" So, I tell my students that ... I call that cocktail chatter. That one piece, it's from a slight political gabfest. That one piece of information that you want to talk about over the weekend when you're having drinks with friends. That's what, when I go off on a tangent, I'll call it cocktail chatter. I said to them, "Rather

> than ask me if it's gonna be on the exam, ask me if it's cocktail chatter." So, [male student] was telling me that he and [female student] were talking literally, having cocktails and talking cocktail chatter about my class, and about just different things. And, that's why I do it. So that people might remember something, and feel better about themselves. As long as I can still do that, I want to.

On the other hand, Natasha, when asked if she recently had a recent moment when she didn't feel effective as a teacher, describes a class where she didn't incorporate relevant, real-world connections, and suffered for it:

> And so like I can use yesterday as an example, I know because they all left, as I did, like, "Wow, that was not effective" ….I think what happened was -- I didn't make those connections, right? The content was all very clear but there wasn't any way for them to contextualize, right? So this is the application of the content and so from that standpoint I was probably not at that higher level of teaching.

It is clear from the above examples that adjunct faculty recognize the importance of relevant, real-world examples in their classes and aim to incorporate them as much as possible, from the simplest analogies, to developing important life skills that can be applied outside the classroom.

Engaging students: Utilizing a variety of teaching practices

All of the participants described an evolution in the teaching approaches that moved from fairly traditional teaching practices, like lecturing and writing on

blackboards and transparencies, to incorporating a variety of other teaching practices, all in an effort to engage their students in the material in their courses.

Using traditional teaching practices as early teachers

Almost all of the participants described their first teaching experience as using PowerPoint slides or transparencies or the black/whiteboards to supplement what was primarily a lecture-driven classroom. Wanda described using transparencies in her first nutrition classes:

> Some of the companies, they would send you a stack of transparencies. So I guess it started off with me writing them, and then I got the picture. So yeah, I would write, "Vitamin water soluble, fat soluble, [vitamins] A, D, E, K, B, and C." I don't know if I did it before class or during class, and also I guess we were told just use your transparencies, but use the board so you have a different…medium.

When asked if she used primarily lecture, Wanda replied, "Yeah. In a large class, it was mostly lecture." Her first classes were sizable, with upwards of 150 students enrolled. Philip also described going back and forth between blackboards and transparencies:

> Most of the time it would be on the blackboard. Sometimes I would use overheads if I needed them. When I was at [public research university he attended for graduate school] everything was done on the blackboard, because we didn't have, in the labs we certainly didn't have overheads and things. I was going back and forth between the overheads and the chalkboard.

When asked if the class was primarily lecture driven, Philip responded, “Yeah.” Malcolm described not being as connected to his students when he first started teaching because of the space that he was in, stating:

> Early on, it was PowerPoints. Because the system was hardly ever up, it was a struggle, but early on I did PowerPoints. I wasn't that actively involved with [the students], but the room I was in was literally an amphitheater, so, I wasn't able to walk around the room.

Both Rachel and Melinda mentioned that they always opened their lectures up to questions from their students, but both indicated that their first teaching experiences were less than satisfactory to them as a result of mostly using lecture to present the material. Rachel, when asked to describe how she approached teaching her first class, stated, “Probably PowerPoints….I always thought it was kind of boring after a while to just talk at them. I always encouraged them to ask questions, or you know, comment. I think it started more with mostly me lecturing.” Melinda actually reflected back on her first teaching experience, knowing that she would approach it differently:

> It was a lot more textbook and whiteboard, a lot of writing, opening up to questions. I would've done that, if I had to do that course a little bit different. I would've done it differently the first time.

Natasha and Sofia both indicated that while the majority of their approach consisted of lecturing, they both also incorporated alternative activities in their first classes. “So I used the whiteboards a lot and then I would do worksheets with diagrams from the book and you know, like, guided things for them to do in class,” stated Natasha, describing how she taught her first introductory biology courses. Sofia taught a

general education night course that was three hours long, so she incorporated activities to break up the time, and assigned a hands-on activity at home. She described some when asked how she approached teaching her first class:

> Probably PowerPoint lecture. Some PowerPoint lecture. I did have these, I tried to bring lab into it and case studies so I know I did a case study of Narragansett Bay. Some real stuff that was going on. And the hands-on activity which was for them to grow their own ecosystems.

Sofia then went on to describe a terrarium experiment that she sent home with her students where they modeled watershed and pollution. Using this experiment in her first class really solidified her use of hands-on activities because, as she reported, "They loved it….The feedback that I got was that they wrote pages and pages about….It was like, wow. You required some five-page lab report and I got 10 [pages]."

Adding alternative teaching practices through the years

Each of the participants described how they began to incorporate a variety of teaching practices in their classrooms to increase student engagement in the material. The participants actually described what appeared to be a spectrum of adoption of alternative teaching practices, where Malcolm existed on the more traditional end of the spectrum using mostly lecture as his practice. Others existed in the middle, using various alternative teaching practices, and Melinda and Sophia existing at the other end of the spectrum using alternative practices on a daily basis.

Malcolm was the least experienced in using techniques other than lecturing, but was particularly proud that he had begun to incorporate crosswords into his

classroom to allow student to work together to understand vocabulary. Malcolm described his current teaching approach as follows:

> Class is usually an hour. It's supposed to be an hour and 15, so I lecture usually half an hour. Then I will have them work on a crossword that is related….Then we will review it. Then if there's time, I might lecture some more.

While many wouldn't categorize a simple crossword activity as an impactful change in practice, it may be an important first step to perhaps incorporating other types of activities as time passes. Malcolm very excitedly described his crossword puzzles during the interview, indicating that this was, for him, a departure from his typical teaching practice. This may be in part due to Malcolm's philosophy of what teaching is supposed to be. Malcolm outwardly described the transmission model of teaching, also known as banking education, stating, "The two [sections] I teach are probably the easiest [at the university], because as long as you show up, listen, I will transfer all this information into your head, and you will leave with all this information, and that's all I'm after." Malcolm also saw no value in having students take notes in the classroom, a skill that has been shown to help students retain more information, stating:

> I don't want them sitting there writing every word I say. No. I don't. I hand it out. Here it all is. Here it all is. You can highlight it, but you really don't have to add anything on this. Everything I will say here today is right on here.

Philip, on the other hand, saw value in using alternative teaching techniques, but has been limited in his ability to use them due to the nature of his courses. He teaches chemistry, both lectures and labs, and because labs traditionally contain the hands-on, portion of the course, Philip still primarily uses lecturing to deliver content in his

classes. However, he made mention of problem sets when asked about using them when he first started teaching, stating “Once in a while we would do problem sets. I do much of them now, I didn't do a lot of them back then.” He also realized that the students enjoyed working on problems in class in his first semester teaching at the community college:

> I found the first semester that I was teaching, there was one handout we had about, it was on balancing equations, and I handed it out midway through the class there and they loved doing it. I started making up more of these handouts so most breaks I would give them a handout, an extra credit handout, it's like a point. But over the course of 25 lectures, the points started adding up and it's a sneaky way of making 'em do more homework than they otherwise would.

Philip did also note that one of the benefits of being a retired part-time faculty member is that he has more time than full-time faculty to grade assignments and exams, and as such, he uses more open-ended questions on exams so that they are less objective and students can earn partial credit:

> That's one thing that I have to some of the full-timers. I have ... I can allow myself to take the time and I will always have a couple of partial credit multiple choice questions which the scantron isn't gonna mark but I will go back and take now, I can take the Excel file. Put it into my computer and say okay, these are the ones that get partial credit.

Philip does also incorporate videos and other resources, but not so much during class time, stating:

> I was using videos but it's so great and I…was putting stuff, the tutorials, the You Tube tutorials, the note packages, other stuff up on Blackboard [a learning management system online] and saying, you know, if you ever need something it's going to be there.

While there is plenty of chemistry education research that highlights how to incorporate alternative teaching practices into large chemistry lectures, the use of it is not widespread, and it appeared that Philip was not wholly aware of these alternatives.

The rest of the participants all were much more enthusiastic about the alternative teaching techniques they used in their classes, ranging from making sure there are more discussions, to adding popular culture movies and podcasts to their curriculum, to incorporating much more hands-on activities, where the students are engaged in investigating a problem and seeking the answer themselves, as their teaching progressed. Wanda incorporates clicker technology to assess whether students are using the resources she assigns outside of class, flipping her classroom:

> I use clickers, turning point technology, so I use that. That's also five percent of their grade. I made videos with Camtasia so I have them and there are a number of them that are assigned throughout the semester. I use Blackboard and I have like each topic, a folder for each topic, and there's watch, read, listen. If there are podcasts that I want them to listen to, so the clicker questions might be about the video, or about an article they were supposed to read, or about a topic that we just covered.

While some of Wanda's classes are flipped, as described above, other classes are a little different. She said "I'm very Socratic, I want them to call and respond, so I want

to be the center of attention," so she does incorporate a lot of discussions in her classes – oftentimes when she has covered content through the use of her Camtasia videos. Natasha and Sofia both discuss incorporating discussions into their classes, which for Natasha can be a challenge when she is teaching anatomy and physiology:

> It's such a tough class [be]cause it's so much content. You almost have to organize it for the students. I mean, we do case studies. I try not to be, again, like I said earlier, what I don't like about my teachers. We do case studies, I bring in articles and have them read it and do discussion based stuff. Um, but, because it's A&P, a lot of is - you have to memorize this and this is this process.

As mentioned in the previous section, Natasha really feels the need to make sure she incorporates discussion and alternative teaching approaches, like case studies, in to her anatomy classes because that's where her students connect to the material. Rachel described using popular culture movies to help solidify topic in her microbiology course and the response from her students:

> We watched a movie, Contagion, which was with [Kate Winslet and] Matt Damon. So it was a regular movie but it was actually really well done because it talked about the CDC and so they loved that all these science terms they had learned the whole semester were now in the movie and so the science I asked them, "What was wrong with that movie? Where did it not follow the signs?" They were so excited to hear these terms and to know what they meant.

This example also ties back to making science relevant – utilizing a popular culture references like movies and television shows help to give students a scaffold upon

which to build new knowledge, at the same time as pulling away from the traditional lecture model of teaching.

Sofia, Rachel and Melinda were all very much into using hands-on teaching approaches, even in courses without assigned labs. Rachel uses her hands-on activities as a way to ease her students into not being so afraid of science, stating

> When you have kids who say they hate science, they're scared of science, but you do something fun or in small doses and you tell them they can't do it wrong. Don't worry, there's nothing wrong, you can't do anything wrong here. I give them a Petri plate and tell them to go wipe something [to see what microbes are there].

Rachel also describes other activities that contextualize the content she teaches. To show how an epidemic begins, she described, "I did like, synthetic epidemic and so I put glow-in-the- dark powder on their glove and they shake hands and it spreads around the room and they love it. They love it." To teach how exercising can change the pH of the body, she describes using a respiratory exercise:

> ...they had a basic solution with some PH and decanter and they blew into it and changed the PH and then I had them exercise and then did the same thing and then they timed how long it took the PH to change, the color to change. So they associated the increase in CO_2 with the change in PH and they saw that they had more CO_2 because they exercised.

All of the examples above highlight how Rachel's hand-on teaching practices allow the student to experience or investigate a phenomenon, rather than being told in a lecture format.

For Sofia and Melinda, alternative teaching practices were a daily part of their classroom activities. Melinda began incorporating more hands-on practices in her classes because her curriculum changed and she had more time, stating:

> I had the entire science curriculum that was to be covered in this class and that was a lot. So it was physical science, life science, or space science, earth science….So that was a lot to do in one semester. So I had to move from one topic to the next topic so I didn't have time for labs and stuff, and sometimes I have to go through this. But then they changed it….A year later. And they're like okay, we'll just have one semester focused on physical science and one semester focused on life science and space science. And when they did that it just changed….It was like, I could do a lot more labs. In fact, almost every class we did something. So it changed the game.

Melinda typically starts out her physics classes with a hands-on activity, as she describes below:

> Usually I start up always with an icebreaker build. They usually build something…So I usually start them doing that. Maybe a structure build, and then they usually build something really tall, or whatever. And then I ask them what concepts did you use? So they talk about that.

Melinda also does hands-on activities so much that she requires students to bring certain materials to her science methods classes that are taken by elementary education students. “They're thrilled. They're like, they get to color. I actually do, I did for my syllabus. Like now it's like bring colored pencils and scissors and glue sticks. It's on the syllabus.” Melinda’s activities are designed so that her students can take them and

use them in their own future classrooms. She also gets good feedback from her students when using alternative teaching practices, even in her early classes, impacting the way she feels about teaching:

> Yeah, I think when it was not the presentation slides and it was like when I did the lab or so on, I could see the enthusiasm in the kids so I was like, you know, I wish I could do more of this, I feel good about it.

Sofia was the strongest proponent regarding alternative teaching approaches in the classroom, having spent a good portion of her career working with K-12 teachers on inquiry-based techniques in their classrooms. She defined inquiry-based to me, comparing it to the way labs were originally taught, stating:

> ...the difference in the old labs when you did labs was that it was all laid out, what you did, and you kind of knew what the answer was supposed to be at the end and so it wasn't terribly gripping or interesting although it could be fun, whereas inquiry-based science is the entire lesson from beginning to end isn't separate lab/lecture, it really is, the students are thinking about the topic and exploring ideas about it and coming with their own hypothesis.

Sofia was very deliberate about building her course around inquiry-based, hands-on activities. One of her projects she describes below:

> One of their projects [is] they have to follow a tree all semester and learn about trees changing color and make a chart of what happens to it…they have a theme of tree. So then we learned photosynthesis, a tree doing photosynthesis and then tree leaves fall on the ground and what's happening - that's decomposition. So I relate everything to trees and they love it. I couldn't

> believe it. They said this is the greatest project. I get to go outside and look at my tree.

Another activity Sofia includes in her classes not only is hands-on, but ties very much in to relevant skills students can use outside the classroom, like composting, and even turns it into a mini-competition:

> I have contests in which there's teams of students making compost and they know that they have to learn for their homework how to make compost, they bring in their materials, they make compost….Then we have a contest. They measure the temperature in it - whose compost reached the highest temperature, and then we plant seeds in them and whose seeds grew the best, they get extra credit added on. So it's like this really big deal, they take that very seriously.

From the examples above, it is clear that while some adjunct faculty, like Malcolm, subscribe to more traditional banking education approach to teaching, the majority of adjunct faculty value alternative teaching practices that include discussions, using technology, hands-on and inquiry-based approaches and use them frequently in the classes.

Quite possibly the most important takeaway from the findings here was that all of the participants in this study at least attempted to incorporate some type of alternative teaching practice in their classrooms, and that may contradict the evidence in the existing literature that adjunct instructors teach using fewer creative, student-centered or collaborative activities (Baldwin and Wawrzynski, 2011; Eagan, 2007; Leslie and Gappa, 2002; Schuetz, 2002; Umbach, 2007). It is well known in the

literature that preparing and employing alternative teaching practices takes more time and effort, therefore serving as a barrier for some faculty to adopt (Henderson & Dancy, 2007; Sunal et al., 2001; Sunal and Hodges, 1997). Some of the participants in this study nullify the continuing assumption that because adjunct faculty have less time and connection to their institutions, they are more likely to choose teaching approaches that are easier to employ, like preparing and giving a lecture. For some of the participants, like Sofia and Melinda, every class period has some alternative teaching practice built into the plan, to ensure student engagement every day.

Making personal connections with students

The last important theme that was described by most of the participants when they described their teaching was that they made a point to develop relationships with their students. Another common assumption about adjunct faculty is that due to their transient nature and not being required to advise or spend time with students outside of class, they don't develop relationships with their students. According to a study conducted by the Center for Community College Student Engagement, 40% of part-time faculty in community colleges indicate that they spend zero hours advising students (formally or informally) and 47% indicate that they spend zero hours outside of class interacting with students (CCCSE, 2009). While these numbers come from community college faculty, it is likely adjunct faculty at 4-year institutions have similar responses. Considering that part-time instructors are often responsible for teaching introductory courses for first-year students, the connection gap between students and faculty in these courses is concerning, especially for retention rates in first-year students (Chen, 2012; Deutsch, 2015; Eagan & Jaeger, 2008; Ehrenberg &

Zhang, 2005; Harrington & Schibik, 2001; Ronco & Cahill, 2004). However, in contrast to the literature, six of the seven participants in this study explicitly mentioned the relationships they develop with their students, many tying it directly to their effectiveness as a teacher.

Natasha described what she didn't want to be as a teacher, reflecting back on professors she had in school, stating, "I don't want to be talked at. Like a talking head. You didn't know anything about them - there wasn't any personal connection." When asked what satisfied her as a teacher, she referred back to the relationships between students and teachers and the impact they have on her own learning:

> I think probably my most satisfying time when working is when I'm probably being challenged, right, like, as far, so probably when - I think it's a balance - you have that moment where you know you're resonating with the students and you see the light bulbs going off and you know they're getting it and the same time it's challenging enough when a group of individuals - like your own knowledge is being tested. So you're not complacent. You're seeing that they're learning, in turn you're learning despite the fact that you're the teacher. That's probably when I'm most satisfied. I don't know how to quantify that since satisfaction is uh -- yeah. But when I walk away from a day and I think they got something and they the questions they asked or an interaction that made me think about it differently, then I'm pretty satisfied.

Sofia's reflection on personal connections was simple: "But then I love the students. I've fallen in love with each class of students, it just sounds so strange." Rachel described becoming a role one might not expect of their professors:

> Not that anybody really needs another mother but sometimes I feel like some of my attribute has to do with being a mother of people of this age. What's important and what's not important. You know, I talk to them the way I talk to my children. It's funny because this is a Catholic school but I talk about birth control and infectious diseases and risk factors and things and I think they need to have this information. They need it to live a healthy and safe life. So, and it's funny sometimes. I had two students come up to me this semester and go "See my eye? Do you think I need to go to the health care?" I'm not sure and they can't say that to their mother who's maybe a hundred miles away.

Philip developed a lifelong friendship because of his personal connection to his students, stating:

> I do remember one student from one of the organic labs who became a friend for life, because part of it was I wrote him a letter of recommendation to get him into optometry school and he became an optometrist….He was that success story.

Malcolm shows up early to his classes so he can develop more personal connections to his students, stating:

> Know them all. I mean, I try hard, and I think a teacher has to try, and that's why I'm happier now, because I can show up earlier. I really want to know who they are…. It has really helped, because frequently I'll see someone I've had, and they "Hi, Professor. How are you?" You know? I mean, we have a rapport. I even had someone ask me to be a judge on her senior [thesis].

Malcolm's interview took place just before his afternoon class started and he pointed out in the hallway when I asked how his class was run, and said "Well, I don't know if you saw….Only several of them show up early…and they show up early because we socialize. I talk to them. We socialize." Several of his students were in the classroom 20 to 30 minutes before class was scheduled to begin.

One reason the participants in this study may contradict the prevailing narrative that adjunct faculty don't have time or opportunities to make connections with students may be tied to their motivations for pursing adjunct positions. Since all of the participants were classified as either freelancers or career enders, they all held fairly reasonable teaching loads, even if they taught for more than one institution (five participants currently taught for only one institution, two participants currently taught at two institutions). By reasonable teaching loads, none of them taught more than four courses at the time of their interviews, four courses being a typical teaching load at a primarily teaching institution. Philip may have taught more than four at times, because he did mention the ability to teach three courses at each of the institutions for which he worked based on collective bargaining agreements. It was also only Philip that taught large class sizes, being responsible for teaching chemistry lectures at a state university. As a result, it isn't a stretch to understand that it is possible for the majority of the participants in this study to develop relationships with their students beyond knowing their names.

Research question #2.

Research question #2: *How do veteran adjunct faculty, who teach in the natural sciences, describe their development of pedagogical skills along the Dreyfus*

and Dreyfus (1980) Novice to Expert Skill Model? This section will highlight responses from the participants that illustrate their development over time, based on the stages in the model: Novice, Advanced Beginner, Competent, Proficient, and Expert.

Novice stage

The novice stage of teaching development is characterized by a very black and white, concrete view of teaching. Novice teachers follow the rules that they have been given for how a classroom is supposed to run, and don't stray from those rules (Berliner, 2004; Dreyfus & Dreyfus, 1980). But because they are given context-free rules, when the context changes, they have difficulty adapting to a situation.

One of the most interesting findings of this research is that when they began teaching as adjunct instructors, all of the participants in this study self-identified as not being Novices in their first classrooms. Only Sofia identified as somewhere between Novice and Advanced Beginner. Natasha and Rachel solidly identified as Advanced Beginners when they started teaching, whereas Wanda and Melinda both identified somewhere between Advanced Beginner and Competent. Both Malcolm and Philip self-identified as Competent in their first classrooms.

In the interviews, there were a few examples of some of the participants exhibiting novice behavior, but for the most part, their descriptions of their early classes showed development beyond the skills of a Novice. Natasha's description of her first teaching experience embodied some of the main characteristics of a novice, particularly in having no experience with the situation in which she was expected to perform. Natasha described feeling terrified in her first introductory biology course,

stating, “I know I can tell you about photosynthesis and cellular respiration but I don’t know to do that where you’ll get it. I remember like literally staring at the board, like, what do I even do here?” Despite being confident in her content knowledge, she had very little pedagogical knowledge to utilize in those early classes. Wanda shared a similar experience in her first class, which was a large enrollment section of nutrition. When she was asked how effective she was, she said, “It probably was not effective because I didn't know what I was doing. I was just doing it.” Natasha also almost pined for being a Novice at one point, despite probably being an Advanced Beginner. When Natasha examined the model to determine her starting level of skill, she remarked on teaching not being as simple as she had hoped, stating, “I think I knew everything wasn’t sort of like black and white, right, but I kind of knew there was some - I kind of almost was hoping it was black and white and it wasn’t.”

The novice stage of teaching development, as described by Berliner (2004), was developed to describe the experiences of K-12 teachers coming out of a teacher education program – novice teachers are typically student teachers or first-year teachers. Obviously, this type of description isn’t useful to describe the experiences of adjunct instructors, or even full-time faculty, as neither typically get a formal education in how to teach before they are given teaching responsibilities, even as graduate students. So instead of falling back on “the rules” they have been taught, they must utilize knowledge they have from other parts of the life experiences to determine what kind of a teacher they are. The main response was that their experience with bad instructors when they were in school helped them identify the type of instructor that they didn’t want to be. Natasha described her experiences as a student when asked

how she knew the classroom wasn't as black and white as she wished it would be, before even stepping into a classroom of her own:

> I think just previous teachers and grad school and previous educators and what probably subconsciously was effective to me and my peers that we all talked about. Like why we liked somebody's course better than others and met some of those criteria. It was the ones that could have changed things up when they realized we were all staring at them without the answer. So I think it was probably just the years of education…being a student myself.

Melinda also mentioned when asked where some of her early skills developed that, "the fact that I went to many years of school, and I feel like at least with the material I felt pretty good." Both Wanda and Philip describe specific teachers they had in school that turned them off to a particular type of teaching that wasn't as advanced, mostly because that wasn't the focus of that instructor's career. Wanda elaborated, "I had professor in grad school who read from the textbook. That's horrible. He couldn't teach, but he was tenure track, so he did his research." Philip also described a teacher he had in graduate school stating:

> I had a couple of really bad teachers. And I had one really awful teacher when I was in grad school. She was research first, and the way she would teach was, she would take one of the desks, put it up to the front, look at her notes and read. And did not understand why her evaluations were so bad.

Malcolm identified both his own previous teachers and those of his children as helping him decide what kind of a teacher he wanted to be, saying, "What appealed to me is probably locking horns with the teachers that my children had, and the teachers that I

had. Really none of them knew how to teach." The participants reflected that these early interactions with other instructors gave them a little bit more grounding in what it meant to be a good teacher. These responses are supported in the literature by Oleson and Hora (2014) in their research as to where faculty develop their knowledge of teaching. In their study, 22 of 56 respondents identified experiences they had as a student contributing to the way they approached their teaching. As we will see later on, participants valued peer observations to help develop their skills – but these observations of their own instructors were still valuable to their development.

Of the seven participants, Natasha, Rachel, Philip, and Wanda taught as part of their graduate programs. While most of them found support lacking while they were teaching assistants, as we will revisit later, but having the experience to teach in labs or recitations as graduate students allowed some of the participants to experience the novice stage of teaching before they were responsible for their own courses. Philip mentioned his experience teaching chemistry labs, where he was well sought after by professors and students alike, and got a lot of teaching experience in the process:

> For a while, I was the only native English speaker teaching organic lab, so I would not only be teaching mine, but the lab next door would come over and listen to me. Eventually we wound up having to have a Friday afternoon lab lecture for the coming week. Either my boss or I would teach them.

Wanda was the only participant who was offered a class as a graduate student on teaching, stating, "When I was in graduate school, I took a class on how to teach. They offered that in graduate school. And I took it, and then we got to teach a one-credit course, which met once a week." Considering that the novice stage typically lasts

through the first year of teaching, the participants that had several years of experience as teaching assistants would have experienced the novice stage before entering their own classrooms as adjunct professors.

Surprisingly, several of the participants attributed their "jump" over the novice stage to the fact that they were parents. This too is supported in the literature, as Oleson and Hora (2014) reported that 10 of their 53 respondents recognized their experiences as parents as contributing to their teaching approaches. Rachel, when asked how comfortable she felt in her first class as an instructor, reflected on her time prior to teaching as a stay at home mother:

> Yeah, no I think I did probably feel a little more comfortable, I think 'cause… So my youngest was probably seven. And my oldest was 14 so, you know I was an in involved mother. I was very aware of the teaching process and what kids respond to. Maybe not college age….I think parenting is, I don't want to say motherhood, but parenting maybe provides you with some skills that can be applied here.

Sofia also referred to her experience with her children prior to teaching when asked about how she developed some of her skills she used in education, stating, "Having children. I mean children, watch them go to school, when they - and I enjoyed working with my children and teaching them when they would come to my science lab….And then science fairs and that was fun." Melinda, who was also a stay at home mother for some time, attributed some of her development to being a parent and a Girl Scout leader:

> Maybe because I have kids….[I] knew that you can't be so rigid….And actually before I even started teaching I was a Girl Scout leader, and I had a co-leader who was a teacher, is a teacher, elementary school. So I learned so much from her, like how to run these sessions. And I kind of applied that a little bit already into the classroom. So I probably started off with a little more teaching background than I actually thought I did.

Malcolm also referred to his children and how he uses them as an example to his students, stating, "I've taught all my children also and I've got four of them. I mean all I ever hear is they're unbelievably hard workers, they do more than I ask. That's the way it ought to be."

Teaching, along with other "caring" professions, like social work and counseling is a job in which parenting provides an emotional infrastructure for the job (Shaw, 1995). Similar autobiographical accounts of teachers utilizing their parenting skills in teaching can be found in the literature. Madeline Grumet (1988) celebrates how teaching offers an opportunity to "mother" outside of her home and incorporated it deeply into her pedagogy. Sophie Freud Lowenstein (1980) wrote about how she could use her mothering skills while teaching and achieve close to "perfect" status – something of which she could not, nor can anyone, as a mother. Because of the tight relationship between teaching and parenting, it is not surprising that the parents in this study could utilize some of those skills to skip the novice stage when they begin teaching later in life, mostly in regards to the characteristic that novices work by the book and that everything is black and white, as many parents experience living in the grey with regards to making parenting decisions.

Advanced beginner stage

The advanced beginner stage is defined by teachers having some expanded context and experience that helps them see that rules have exceptions, still being challenged when faced with novel difficult situations (Berliner, 2004). The participants in this study, when asked to describe their first teaching experiences, exhibited a good number of advanced beginner characteristics, such as being marginally effective, missing critical details, and having trouble navigating challenging situations with students. They also described a lot of fear and uncertainty in this stage, which would be considered normal for a new teacher.

As stated above, several of the participants identified as being advanced beginners when they started teaching their own classes. This was particularly clear when they were asked how effective they thought they were in their early classes – responding in a way that indicated they could, at that time, demonstrate marginally acceptable performance. Natasha, when asked if she ever had an early class of hers where she felt spot-on as a teacher, said:

> No. No. [Laughter] I mean being effective, probably yes, but I would say I my measuring of effectiveness was more content-driven than being an effective teacher. Which I think, now, basically, years later, I feel like those are two different objectives. Right?

In this quote, Natasha reveals that her measures of what it means to be a successful teacher have changed since she was an advanced beginner. Early on in her career she was far more focused on content and the grades of her students. She probably felt effective when she saw her students do well on multiple choice exams, where basic

recall and very little analysis and synthesis were happening. Over time, however, she realized that focusing solely on the measures of content, rather than perhaps critical thinking skill development, was only being a marginally effective teacher. Philip also focused on content measures to examine his effectiveness as an instructor, stating, “I think it was effective enough. Most of what I was basing it on was the grades that I was seeing.” Melinda was fairly critical of herself as an early instructor, saying, “I'm very critical of myself, so I don't know if I were rate myself out of 10, I'd probably give myself a five to six,” in regards to her effectiveness in her first classes. Sofia, on the other hand, was actually very surprised about how well she was able to reach her students, replying when asked how effective she found her teaching in her first class:

> I was surprisingly happy with it. I’m sure that that maybe because I was beginning it was even better, I don’t know. The students, as I said, all of them came up and thanked me at the end and said how much they learned and that I changed their view of science.

Sofia had the benefit of having had at least a little bit of pedagogical instruction as part of being involved with a K-12 teacher outreach program, and as a result perhaps focused less on the content she was delivering and more on how to connect and engage her students to the content. Similarly, Rachel had a student in her first human biology course that expressed desire to change majors to biology after taking her course. When that segued into a question on effectiveness in that first class, Rachel replied,

> I think that that might have been more of a response to the material. Like I said, again, you’re teaching bio [so] there’s something for everybody, I mean,

> they're all humans so they all connect to it. [But], I think that's obviously not effective enough because I still tweak it, in hindsight.

So despite engaging at least one of her students to the point of changing majors, Rachel still felt her teaching wasn't effective enough and began modifying it. For the most part, the participants accepted that they were probably effective, but not to the degree to which they really wanted to be – they recognized the need for improvement.

Rachel and Wanda both used experiences from their first teaching experiences to highlight how they were not novices at that point. Rachel took over a lab course in the middle of the term, stating:

> She had already been teaching most of the semester, I was doing kind of the backend. And so everything was sort of set and I was just coming and doing it. And um, she graded their lab notebooks twice a year. It was a lot of notebooks. She said "Oh, I don't need read them"….And I said, yeah that doesn't seem fair, they spent all this time working on it. So I took a piece of paper from a pad and I went through all the labs I was supposed to and told them, "You're missing this, you're missing this," and I remember the professor for the class said, students hadn't never seen anything like that. So uh, I know for sure I didn't do everything by the book.

Here, we see that if Rachel was a novice, she would have taught the class as the original professor had intended without deviating from that plan. Instead, Rachel made mention of the time and effort students had put into their work and wanted to make sure that they were assessed for it. She showed a flexibility in her teaching that is not reflective of being a novice. Similarly, Wanda reflected back on her experience

teaching in graduate school to highlight how flexibility was one of her strong suits, even as a young instructor, describing:

> I'm showing my transparencies and suddenly there's smoke coming out of the projector. I look at the guy in the front row, and I had maybe 150 students in the class, these were big classes at [large public research institution]. I looked at him and I said, "Do you see that?" And he said, "Yes." So then I tried to switch the light bulb, and that didn't work. So I turned it off and I went and used the blackboard. [The professor supervising] was so impressed that I didn't fall apart in front of the class.

These two examples showed how Rachel and Wanda were beyond the novice stage and well into the advanced beginner stage when they began teaching, neither really falling into the trap of blindly following the rules or panicking when something went wrong.

Natasha described an epiphany she had while teaching her first course that really highlighted that advanced beginners are sometimes unable to see the entirety of a new situation and may miss critical details. When asked about a time that she may have flopped as a teacher in her first class on her own, she replied:

> I definitely think there were levels of satisfaction, leaving that day like, “Yeah, I’m pretty sure that didn’t… I don’t think they’re going to remember anything that…” But I do think it was [based on] my level of enthusiasm of the content, so recognizing that should be obvious but right when you’ve never taught, right? That wasn’t obvious to me. I set the tone for what the content is, like photosynthesis. I don’t find that very fascinating, I’m not a botanist and so

> right, I think that that was probably my worst class in the sense of I don't care about [botany], so how do I care about it if I don't care about it? If I didn't have probably a great poker face for that one, so I don't think they develop a great appreciation for it. So I think that that's like over those sort-of hiccups like, oh, right, I can do that differently.

Natasha clearly didn't realize at the time that her passion for a topic came through to the students, so if she was less enthusiastic about a topic, her students would sense that and have trouble engaging and retaining in the information. Philip had a similar revelation while he was teaching, stating:

> I didn't realize this when I was younger, but I realize it now, is that I have a really good memory for trivia... it surprised me when other people don't have the kind of memory that I do. I wasn't aware of that. I am very good at math and seeing math and also visualizing shapes in my head and seeing mathematical connections that allow people….That's something I constantly have to keep reminding myself about and it's something I was unaware of back then but I am aware of now.

Both Natasha and Philip didn't have enough knowledge about what it means to be a learner, and so they both missed critical details in their early teaching experiences.

Rachel described an experience that really highlighted that advanced beginners have difficulty sensing what is important, focusing on the basic mechanics of teaching:

> Some of it was really basic things like how much can you put on a slide? You know, first of all you're making slides, all of that. When I was in graduate

> school, we made slides. I had slides for my thesis proposal. Thirty slides. So, PowerPoint, all of that, I was still learning how to do all of that.

The fact that instead of focusing on how to teach material, she was so focused on how to create and design presentation slides is very indicative of the advanced beginner stage. It's possible that many early teachers spend a lot of time worrying about the things within their control, like making slides for a lecture, at that stage.

Melinda also highlighted that advanced beginners have difficulty handling challenging situations when she had to deal with some unacceptable behavior in her early classes:

> But I remember one time that these two boys just walked in, and they smell like [marijuana], you know. And I'm like, what do I do, right?...Or when students cheat. What do you do?...It's awkward. And I don't know. Sometimes I feel like [her institution] should just really ... I know what they would say in writing. I know that. But somehow I'm not sure if that really applies….You know? Because they're also trying to retain these kids.

Early on in her career, Melinda may not have had the skills needed to develop a relationship with her students that she could feel comfortable speaking to them about their situation. I think back to a situation I encountered with a student regarding drug use, probably around my seventh year of teaching. I overheard one of my students while walking to the library making what appeared to be a drug deal, and my assumption was confirmed when the student turned around and looked like a deer in headlights. Later in class, the student approached me and all I said was "I didn't heard the specifics, but let's be a little more aware of our surroundings if we are doing

something we don't want to be caught doing." That is not something I could have done in my first or second years of teaching, because the relationships I developed with my students later in my career were deeper than those developed early on. Melinda may have felt the same way. She also indicated that situations like the above were still difficult for her to encounter because of her status as a part-time faculty member, and that she was afraid to push too hard against students because, as she said, "I'm not locked in….No job security." Sofia also reflected back on a situation where students went above her head to make a complaint about her teaching in her first course, describing:

> I told you that the students rose up against me and told me I was giving too much homework, which really threw me and I don't recall the details of that. I just know the administration backed me up and said I wasn't giving too much homework….That was really scary….The administration looked at what I was doing and said no, they didn't understand and they backed me up. I probably gave less after that.

The feelings of fear and uncertainty when challenging situations arise is very much indicative of the advanced beginner stage.

Overall, some of the participants had difficulties recalling specifics of their first courses on their own, considering that for them those first classes were decades ago. However, it was very clear based on the examples above that several of the participants did in fact begin their professional teaching careers as advanced beginners.

Competent stage

A competent teacher is characterized by someone who becomes emotionally connected to their teaching, and as such feels the weight of their choices when things go wrong. So at this stage, teachers are better able to determine what strategies and techniques work with their students and which ones fall short of engaging or enhancing the learning of their students. Large pedagogical shifts are common in competent teachers, as they begin to figure out what works and what doesn't work with their students, using the trial and error from their previous courses to inform pedagogical decisions. They also begin to impose rigid rules so that they can keep control of their class, giving them the illusion of managing their emotional connection – if they keep control of the class, they won't fail their students as a teacher (Berliner, 2004). Rachel really reflected on what this looked like for her as an educator:

> I was always questioning whether or not I was doing it right, was I doing it right, was I being a good communicator to the students? Do the students know what I wanted? Was I expecting a level of information that they weren't capable of giving back to me? Was that because of my issues, was I not communicating well or they were not studying? Because also when I'm teaching non-majors there's a revelation at some point that this isn't a priority for them and so given that, how much time do they want to put into it? And so if that's the case, that's their choice. But if it's because I'm an ineffective communicator or teacher, then that's on me.

Sofia described a similar experience:

> I'm still nervous before every class. Have I picked the right things? Are they going to fall asleep? Do they hate me? Because I often try a modification of something so I'm not sure how it's going to go. So there's some nervousness and anxiety that I still have and I struggle with that.

Being able to accept their own roles and expending emotional energy in whether students engaged in and retained the course content was a big step towards entering the competent stage.

Competent teachers being to impose rigid rules so as to maintain a sense of control because they recognize that they are now personally responsible for what happens in their classrooms. Because competence takes three to five years to develop, they can't fall back on not having the experience of novice and advanced beginners (Berliner, 2004). Wanda described a situation where she felt she had lost control of her classroom, and as a result, imposed a very rigid process:

> That was 125 students and just me, and there was a situation where I remember giving an exam and I had a student come up to me and say, "Don't look, but those two students are exchanging exams." I had no control of the classroom. So for the final, I brought in three other people, especially when I found out that a student was trying to bribe one of the secretaries for a copy of the final. I brought in my husband and two friends. I had the class divided into four rooms, I made them bring picture ID, they had to go to the bathroom before the exam, they could not get up and leave. And the grades dropped tremendously. So there was a lot of cheating going on in my class.

This experience, tied with an early supervisor who consistently told her to “Keep control of the classroom,” really influences Wanda to maintain a set of fairly rigid rules that create the illusion of control for her, even as other parts of her teaching may have progressed past the competent stage. When asked what makes a teacher ineffective, she replied:

> Somebody who can't control their classroom. That's interesting because I don't have trouble controlling my classroom. One of the things I like about teaching college and not teaching elementary or high school is that if I don't like the kid, I tell him to leave. I've never had to do that. But I do not let them wear their hats during class. I start off my class by saying, "Turn off your tech and take your hats off." Those are my rules.

Malcolm also started his early classes trying to grasp a sense of control. He described a situation on his first day in an actual classroom (he had taught online previously), stating:

> When I initially walked in, students, a few of them were like horsing around, and I said, "Hold it. You and you, out." And they went, "Huh?" I said, "Yes. Out. And after I talk to you next week, I'll make a decision as to whether I will allow you in here anymore."

Imposing rigid, inflexible rules as described above help teachers maintain a sense of control, especially as they begin to realize that some of their chosen strategies don’t work as effectively as they had once thought.

To me, the defining characteristics of a competent teacher are the ability to identify what situations are important, which can be ignored, and make decisions

based on considerable contemplation of the problem at hand. This reveals itself when teachers describe being able to recognize when strategies and techniques they used in the class worked or didn't work. Natasha reflected back on her early courses, looking at teaching almost like a science project:

> I mean this is unfortunate for the students that are your test subjects….So I think it became like, that assignment... it was just recognizing the strengths and weaknesses in individual assignments. So I think it was like a self-reflection on each semester, which unfortunately doesn't help you when you're deep in. So those students are just kind of lost I guess….I knew I could do better but in the sense that I could reach more students more effectively. With the content and I looked at what evaluations or project or whatever I was doing, right? What seemed to resonate with them on previous semesters?

Natasha also reflected that it took a few classes to really gain this insight, stating when asked when she started to feel more confident:

> Probably like the second-go-around. I think I was like, "Okay, this is way more comfortable for me. That, I know that didn't work, I'm not going to do that again, or I know that worked and was effective. So that was a good design there or a good exercise." So I would say after the first go-through, so probably my third semester, I was like, "Okay, I can do this." This is not so uncomfortable.

Natasha describes how her experience comes into play above. In this quote, she was speaking generalities, that by the second and third semesters she taught a class, she could identify which teaching practices, that she did not define here, were working for

her and which were not. Philip has made these types of modifications a part of his course planning process, stating, “I'd pull out last semester's, go through them. Try to remember, okay yeah, this worked, this didn't work, so here's what I'm going to adjust.” He does also note that he makes less adjustments now later in his career, already having worked out the kinks in his practice.

Sofia maintained that not being able to read the students was the sign of an ineffective teacher, stating:

> Probably would maybe do a lot of lecture without realizing that maybe your students, you’re losing your students, not watching the students and knowing what their reactions are and then not trying to do something different, trying to revise. They would do things they don’t even know are working.

Sofia also realizes that making the jump to the competent stage requires experience, even in regards to what seem like simple decisions:

> Just getting more experience with students and how they react to different things. What works and what doesn’t work. You have to give credit for homework or you won’t get it, you know. Some of those practical matters I’ve gotten better at.

Wanda also ties it all back to experience, stating:

> I try to own all my material and I've been teaching long enough that I know what I can pull off and I know what I can't, which is huge. I think that's something that maybe people can start off like that, but it's from experience. I know what I can own.

Sofia also gave an excellent example of this happening in her classroom recently, where an activity she had planned didn't quite work out the way she intended:

> I tried a new activity to teach the greenhouse gas effect and I think I know how I would modify it to do the next time but it ended up, students didn't get a complete understanding from me even though we had a lecture after it. We went outside and the students became molecules of carbon dioxide and sun rays or whatever - they each had a role. The space we did it in was too small so they were all jumbled up together. They were happy to be outside and they got something from it. It could really be a much more effective activity.

Sofia saw the value in the activity, even if it didn't quite have the outcome she expected, and she knew that she could modify it in some way to make it better the next time around.

Both Philip and Malcolm have used student feedback in the past to really focus on the changes they've needed to make, now having the experience of several years of students to be able to read body language and facial features. Malcolm uses students he's identified as maybe not so invested in the course to help him figure out if he's being engaging:

> I'll choose an individual whom I view as difficult to interest, and individuals who aren't, and I will look for a reaction to judge. Early on, I really wasn't able, in that large room, but recently, it's reached a point where the individual who I view as hard to interest has actually said, "Right on." If I had that reaction off him, the others [would have a similar reaction].

Philip used a more formal process to help him see what worked for students, student evaluations, as he described one of his first terms at an institution:

> I always take a look just to see if there's anything. There are one or two things I've picked out of there that you know, that weren't really complaints but were things, you know, room for improvement….One of the things at [four-year institution] that I got the first time I taught the lecture was they, one of the students mentioned I was spending too much time with the slides and not enough doing examples. So I got more towards doing…examples and using slides as a template for that.

Philip also highlighted the fact that teachers at the competent stage are able to see their actions in terms of long-term plans. One of Philip's main fears as an instructor is to get caught by the students for not knowing the answer to a question. He now tries to build that into his courses, stating:

> You go ahead and you make sure that [you] anticipate what kinds of questions there's going to be. I learned then to put the work into getting ready for it, because a lot of people don't put the work into it.

The competent stage is where teachers begin to feel ownership over their classrooms and begin to personalize them, both to ensure they don't lose control and that the course is serving the needs of the students. In the competent stage, teachers utilize their experience to make pedagogical changes to better serve their students. The evidence above shows that all of the participants in this study could be considered competent teachers, with the reminder that reaching the competent stage is not guaranteed.

Proficient stage

Proficient teachers are tempered by experience. They begin to pull back on their rigid, inflexible rules, they begin to organize content in a way that really makes sure the students are grasping the information, and they also begin to think on the fly. Proficient teachers start to make larger pedagogical shifts, really seeing the role that they play in the course (Berliner, 2004). They also perceive situations in terms of "wholes" instead of "parts" – having a much better grasp of their courses as a whole, and of the role their courses have in the larger picture of the institution.

Replacing rigid rules with situational intuition was indicated by several of the participants. Wanda described this phenomenon in a colorful way, stating, "My friend and I have this philosophy that you start bitch and pull back," indicating that you maintain your rules, but relax them as necessary. For example, Wanda says to her students,

> "If I catch you using it, if I see you using your phone, you'll lose a point off your final course grade." But then I'll go, "That being said, if you're expecting a phone call, if you have to take it, then you let me know and you sit by the door."

Rachel has a similar opinion regarding attendance, describing her policy:

> So I also have required attendance, I didn't for a long time, I felt insulted that that was my job. I mean I should not, you come to college because you choose to come to college, no one is making you come and if you don't want to show up to class, that's not my problem. But inevitably, they would not be doing well and then they would come in at the end of the semester and it would

> impossible for people get back to where they had to be. So, I said to them, "I know this is like, silly, but I'm doing this for your own good. You get three absences. You need a mental health day? Take it. You have a job interview? Good luck!"

Requiring attendance and beginning to take it reflects someone in the competent stage – Rachel realized she was losing some control over her students, they were falling behind, so she imposed a rule. However, the inclusion of three absences regardless of whether it is excused shows a flexibility that recognizes that students are humans with lives outside of her classroom. Philip actually admits to relaxing his rules a bit too far, mentioning:

> [I] will not be rigid, can be understanding. In some cases I'm a little too, I bend over a little too far backwards sometimes, and I regret it later….But compassion for the students, understand students, get a feel for what they are in for.

Malcolm indicated that he never had rigid, inflexible rules in the first place, stating, "I am not an inflexible individual. I do not like people who are." This may have been a result of his many years in industry prior to teaching. This flexibility is less mechanical than that found in the advanced beginner stage, where teachers can flexibility react to situations, like a projector breaking. Here we see flexibility more in terms of how they treat their students, also tying back to developing relationships with their students. We can see the development of deeper relationships in the proficient stage, which ultimately culminates in the expert stage where teachers are wholly aware

of the needs of the students they serve, which one cannot know without developing those relationships with students.

Another indication that teachers have moved into the proficient stage is the ability to see the larger picture and really hone in on what pedagogical decisions best serve their students. Natasha really highlighted this when she was discussing how she approaches teaching in her anatomy classes, stating:

> Gross anatomy is just that - it's memorizing. But I think the challenge for me with that and the flip side of that and probably why I'm more on the proficient level of it when I first started is that that's not acceptable, right? Like just memorizing stuff. So I take it as a challenge of like, how do I make that necessary evil applicable to you where you're not just sitting down and making flash cards?

Instead of feeling like a teacher in that class, Natasha describes herself as "an organizer of content…more about how I do I make this material manageable for [the students] in an organized way." Being able to recognize that there was a better way to approach a dry course like anatomy, and realizing she was more a facilitator to help them learn study skills shows her development to the proficient level. Rachel showed a similar development, except that she makes sure to include input from her students. When she was asked what an ineffective teacher did in the classroom, she responded with:

> I think someone very rigid who has in their head what the class show be... I don't think you can rearrange a class to every group of students but personally I send out a survey at the end of the semester….I asked the questions and I

> change in response to the answers I asked them: You know, were your goals met? What were your goals coming into this class besides fulfilling a requirement and were they met? What would have been better for you, you know, did you think the amount of the evaluation in the class was enough? Too little? Too much? For, you know, a non-major class, I asked them things like, I do hands on activities which now are required, [but] when I started I always put them in there. Especially for the non-majors. Did you enjoy this? Should I keep it in class or take it out?

Being willing to take into account student opinions on classroom activities and course content allows Rachel to really put her class in perspective of the student's entire education, which is one of the characteristics of a proficient teacher – perceiving situations in terms of "wholes" instead of "parts." It also serves as a springboard to becoming an expert teacher, especially in the sense of being aware of the context and the needs of who they serve.

Another characteristic of being a proficient teacher is starting to become more flexible mechanically in the classroom, but still needing time to deliberate on their choices. Proficiency shows a higher level of planning, to account for situations where one needs to be flexible, and also to see the "whole" of their course, rather than the individual "parts." The flexibility gets planned into their course. Natasha revealed that the time she needs to plan ahead has changed significantly since she started as a teacher, stating:

> I can adapt a little more quickly throughout the semester where before I was a little more rigid, I kind of needed to know what I was doing, you know, pretty

> far out. Now it's like, okay what's happening this week? Where before it was like, I needed like six weeks of planning.

Rachel, when describing more about her student surveys, noted that she is still trying to figure out the best ways to assess her classes, and as stated above, incorporates her students' opinions into her deliberation:

> This semester I gave two tests and a final and four homeworks and a few quizzes and I'm going to ask them - that's different from last year - that's constantly evolving. One year I gave them a quiz every week... because there was too much information and they were falling behind and after that semester they felt that even that was too much information for a little quiz. And if I gave them a little quiz, because I didn't want to spend a whole day giving them a grade - testing - and only teaching two days. I make a little quiz and they spent all this time studying these three or four questions….And then this semester I gave them a study guide for the first test and I knew some of the grades weren't great and I said to them, you let me know what you think would help all of you. I came up with an idea and my idea is that I'm going to give you the study guide after each chapter instead of before the test and that way as we go through it you can just start to fill this in and create your study guide so by the end -- they all liked that. It's been more positive.

As you can see, Rachel still takes a bit of time to deliberate on the best way to test her students on material, but has been very flexible in those choices based on the feedback she hears from her students – especially when it comes to spending too much time studying for small quizzes. Rachel also does the same regarding content. She plans

ahead the "whole puzzle" and decides how many days to spend on a topic, but to make sure her class is relevant she makes sure that she includes current events, stating:

> Especially when I teach microbiology if there's an outbreak, I always incorporate that, whether it's in the news or whether there was a Nobel prize winner that is somehow is related to something I'm teaching, I try to make it accessible and relevant so any things in the news that somehow ties in, I get it, I use that.

Sofia made mention of her ability to flexibly react in class if something wasn't working, stating:

> I do sometimes change things on the spot with intuition of, I had this plan, but it's just not going to work today or change the order of something, or some other. I usually have more to do, I've thought up more to do than I can fit into one class.

Sofia makes sure to plan more than necessary in each class, so that if something goes awry, she can easily flex into another activity. She also demonstrated her planning when talking about one of her weaknesses as a teacher, describing:

> I still struggle with...leading discussions. I really, really struggle with that. I don't think quickly on my feet for one thing, so I have a prepared list of questions but I react too strongly to what students say.

Sofia clearly could react with situational intuition, but still needed plenty of prior planning to do so. Philip described a situation where he reacted to a class that was having difficulties grasping a particular content area:

> At one point when I was actually [teaching] the course, I noticed that one of my classes was having trouble getting mole ration, it's like geometry. So I wrote a workshop based just for that, and made it optional for everybody in the course who wanted to use that….And my students have really liked that.

Philip made time outside of class to make sure that students understood a basic tenet of chemistry – which if not understood would make it difficult to move on to high-level topics in the course.

As you can see from the evidence above, the majority of the participants did describe instances in their teaching experience that suggest that they had moved at some point into the proficient level, where they become more flexible both in terms mechanical classroom planning and in terms of being more flexible towards students because of the deeper relationships they develop. They also relax their rigid rules that they may have made earlier in their careers to keep control of the class. Their stories suggest that they are more relaxed, but at some points, still required a little bit of deliberation when they were making decisions, making sure to plan flexibility into their courses.

Expert stage

An expert teacher is defined as someone who reacts quickly and with a lot of flexibility that's based on one's experience, and is someone who is aware of the context and the needs of the students they serve. I also believe that experts are very aware of their own shortcomings and as a result have modified their approaches to account for those shortcomings.

Being flexible on the spot is indicative of an expert teacher. Rachel describes this perfectly when she was describing a class that she had the morning of our interview:

> I have homework assignments I collected today and I had given it to them last week and I said to them, "On Wednesday, they were due Monday and they're genetic problems…. Look at it before Sunday night and come back to class on Friday and we'll talk about it. But you've got to look at it before." So they came into class and we started talking about it and I could tell that everybody had problems with one thing. And so as we were talking about it I just said, "Okay! Let's just do the problem together." 'Cause the point is for you to understand it, okay.

Rachel had a plan for the day, but instead ended up focusing on homework problems because she knew that her students weren't understanding the material. This flexibility is different from the proficient level because it happened immediately on the spot – it did not require deliberation on her part to reteach the material – she just did it because that was what her students needed in that moment. Philip mentioned during his interview the need for ultimate flexibility during the winter months, stating:

> Well, I have the experience. I'm flexible. I try to be flexible. I've had to be this semester with all the snow. Although that's mostly been at [community college], because my course in [community college] is Monday, Wednesday and all the snow days have been on Wednesday. But I did lose a day over there and you have to be able to get ... You have to teach everything that you're supposed to teach. So, if you lose four days or you lose a day, you've got to

> make it up somehow and at [4-year college], that involves some serious juggling.

Wanda still doesn't let technical difficulties get in her way, and often plays it off to her students, stating:

> I no longer get upset when, like, I'll be showing something and it'll say the program died. You know, Microsoft Office or whatever dies. I'm like, "Okay, anybody have any good jokes?" I'll just talk or I have the board, so those things don't throw me off in any way. Piss me off, but they don't throw me off.

A key feature of expert teachers is knowing the needs of the students they serve, mostly as a result of developing deep personal connections with their students. For example, Malcolm described a situation where he was very flexible in working with a student who had missed an exam:

> I think a typical teacher would have said, "Only if it's on the hours that I'm here." No. I'm an individual, and my children say I'm crazy, because I've had instances like the end of last year, someone reaches me on my cell. "I thought the exam was Wednesday. It was Tuesday, wasn't it?" She's in tears. I said, "Relax." Now, I live an hour away. "Relax. Are you free this evening?" "Yes, I am." "All right. I'll ride over, and let you take the exam."…Now, I think a typical teacher would say, "Well, wow. Sorry."

Here, we see that Malcolm understands the need for his students to succeed and for him to do all that he can within his power to help them, even if it means taking extra time out of his day to commute back to school to give an exam. Knowing the context of each group of their students required both Philip and Natasha to be flexible when

planning their courses. Philip described that working for both a four-year college and community college exemplified this need for knowing his students' needs:

> I know that I have people who have math background before they get there [four-year college], where over at [community college], most of the time I don't. So, I have to be aware and it's sort of dealing with how I changed notes that I've made for ... And slide packs and things that I did for [community college] and then adapting them for [four-year college] for the four-year people, because I know they need even more depth. They're going to need more math and aimed at what they're doing. A lot of the stuff that I will do at [community college] I will aim at, about half of my students are looking for allied health careers, nursing or phlebotomy.

Natasha recognized a similar pattern, even just between the students that she gets from term to term. When she was asked about what makes someone an effective teacher, she replied:

> I think... there's an inherent flexibility involved. So I think, despite what I plan, like on paper, for what I want to go through, I think it's recognizing whether your strategy is working or not with your students and being able to adapt and recognizing that every group of students is different so what worked last semester or last year might not [work].

Sofia, being aware of her students' needs as business majors, figured out a way to incorporate business practices in her environmental biology classroom, describing

> One thing is I have tried very hard recently [that] last few semesters - including this one. I think about what would grab a business major interest in science. So

> for instance, start-up companies that have been started up because they made a difference in the environment….teams get really excited about that. So they're working on learning about that company and testing that product.

Rachel tapped into her experience when she had to deal with a student who came in and complained about an exam grade, stating:

> This semester I've had a student get very upset at the exams and he had an 80. Really upset over an 80. And I feel like I've done this long enough to know that this was an over-the-top response. This was over-the-top. And it was very difficult conversation with him and he was a little aggressive which worried me. But, the more I spent time thinking about it after the fact, I was more worried about him. Worried [that] the response was so over-the-top and it was a Friday ...so I sent him an email [that] night and said, "I know you were very agitated talking this afternoon. I'm hoping you're feeling better and if you need to, we can talk more on Monday and I hope you have a peaceful or restful weekend." And two days later he responded, "Thank you for reaching out, I do have more perspective now and I would like to talk more to you on Tuesday."

Rachel knew that the student's response in their first meeting was overblown, and to make sure the student was all right, she reached out to him to talk with him again. It turned out he just needed some one-on-one time to go over the questions on the exams.

Rachel's experience with the student above also highlights the needs of a student outside of the classroom, especially in regards to mental health. This ties back to developing deep, personal relationships with students. Both Malcolm and Wanda

mentioned that dealing with students who have anxiety or other mental health issues is something they need to be aware of, even if they aren't completely equipped to deal with it. Wanda especially recognized this and knows she is not the best person to necessarily deal with those issues herself:

> I have students who aren't well and I can't always worry about everyone….I also have serious questions about what are we offering students nowadays. If students have such special needs in terms of emotional issues, is this the right place for them? I don't know from my position of privilege if that's something I should be asking.

Malcolm also made note of students with mental health issues, stating:

> I have students with all sorts of personal issues. I mean, all sorts. Anxiety, a disorder where they have all sorts of issues. I think you need to understand that you will have individuals who have issues, and you also I think have to realize ... I mean, I vividly recall when I was on the other side, all right?

As we can see above, being aware of the needs of the students both inside and outside the classroom is a very important characteristic of being an expert. It comes as a result of developing personal connections to students, which all of the participants identified as part of their teaching, but may be limiting to adjuncts who have difficulties developing relationships with student because of time commitments. But knowing the needs of the students – including their needs as majors versus non-majors, their needs to succeed when they make a mistake, and their mental health needs – requires adjunct faculty to be a little more flexible in the planning and execution of teaching.

It is at the expert stage of development when seeing "the big picture," as Natasha put it, is really a helpful step in developing teaching skills. Natasha spent a few years working on the curriculum committee for one of the courses she taught, and as a result, had a level of interaction at the institutional level that many adjunct faculty don't experience, but would see value in experiencing if only to gain insight to the institutional context of their specific course. For some adjunct faculty, they don't know if their course is a requirement, an elective, or part of the general education program. They may not have any insight to the types of students they teach until they meet their students on the first day. They may not have any idea what the programs of the students they have look like. I am reminded of my second term teaching a course with architecture students and learning about their juried labs when unfortunately those labs coincided with my course's final project date. I personally had no concept at the time of what my students' lives were like at that point in the term, and have certainly no made modification to ensure a conflict doesn't exist anymore. Seeing "the big picture" helps faculty develop their knowledge of the context and enhances their teaching skills, making them more able to be flexible.

Another part of being an expert is knowing one's own limitations as an instructor. Teachers are human and do not know everything. As Wanda put it, "I'm not afraid to admit to my mistakes. I'm not afraid of standing up in front of a classroom and saying, 'I was wrong.'" The way that some of the participants illustrated this characteristic was by describing places where they have added activities, or even removed whole content areas, to make sure that the content that is necessary is

covered effectively. Rachel removed an entire topic on the renal system in human biology, explaining:

> This semester I did change it again - I left out renal. The kidneys are incredibly complex and that's an example of whether or not anybody really needs to know about countercurrent exchange of body parts. You know, it's important for the big picture because it's so important in how your other systems work, but on the other hand….I just felt like, why put us both through this? Me trying to teach it and you all sitting with the...I tried multiple variations on the renal chapter every year because it's always difficult. Always difficult. And I looked for a way to do [it] and this year I decided not to do it.

Rachel could not find a way to effectively teach the section, and later admitted that the only reason you need to know about the renal system is if there is a problem, and then you would theoretically go to an expert to have it diagnosed. To her, the cost of losing her students to a boring topic was too much, so she focused on something else. Sofia also made modifications based on her perceived weaknesses leading discussions, especially about controversial topics:

> I noticed the students are unwilling to discuss climate change openly because it's a politically sensitive issue. So I had found online a questionnaire which they suggested would help people discuss climate change and so everyone on the team filled out the questionnaire, it's very easy to see this chart. So you're either all on the left hand side of I hate government regulation or I think government regulation is useful, all these different things. And they filled it out and had the discussion with their team based on this article and it was great and

> it was like, how this discussion went between two people, and I pulled this chart up and they read it back and then they had their own discussion. And I asked them, does it make this any easier to talk about and they said yes….And so I felt good that I found something that really worked, it didn't rely on me to do the discussion because I really struggle with that.

Sofia went out and found an activity that allowed her to still have a discussion in her class, while not relying on her lack of ability in leading that discussion.

Rachel, Wanda, and Philip all outsource some of their topics to people or videos that better described the things they wanted to cover. Philip did so as a backup to his own lectures, describing his use of videos online:

> One of the things I do with Blackboard and Moodle is I put up tutorials and I explain to them it's because sometimes I'm not going to get it across to you and this person might and the other thing is, you can play it again and again.

Rachel also incorporates videos into her classroom, but uses them when she isn't completely confident coving the information:

> I showed them a Charlie Rose video, he did on a series on the brain and one was dedicated to gender….And you know I find it difficult to lecture on that. I don't feel wise enough to - I fumble on the pronouns and so this was very good. It was very good. I thought it was thought-provoking, you know, and the idea that it's such an evolving science.

Wanda brings in guest lecturers, or has people from her rather large network of colleagues and friends, to go over materials that aren't in her content area of expertise, describing:

> I farm out my topics. When I cover psychological health, I have a friend who teaches abnormal psych, I ask her to go over my stuff. When I cover genetics, I have a friend who works at Dana-Farber, she went over my stuff.

Knowing their own limits and figuring out ways to overcome those limits is really indicative of being an expert teacher, and as seen above, there are several participants who would fit into that category.

The Novice-to-Expert Skill Development Model (Dreyfus & Dreyfus, 1980), adapted to teaching by Berliner (2004) was used to examine the teaching experiences of the adjunct faculty in this study. While the experiences of many of the adjunct faculty interviewed in this study do fit within the stages of pedagogical skill development in the model, there are areas where the model doesn't quite fit, particularly at the ends – the novice and the expert. At the novice end of the model, none of the participants identified as novices during their professional teaching careers. As is clear by this study, "the rules" that novices would fall back on as teachers are different for adjunct faculty, due to their lack of formal education in teaching. They used their previous life experiences as students, graduate student teaching assistants, and parents to determine the type of teacher that they wanted to be, and because of those experiences, were able to jump over the novice stage of development in regards to their teaching. An interesting suggestion for future research would be to see if this pattern of development is similar or different in full-time faculty, as they share a similar pattern of life experiences, and to continue interviewing more adjunct faculty to see if their experiences mesh with the results of this study. The expert end of the model will be discussed in the next section of the dissertation, as

research question #3 dealt with where adjunct faculty currently identified on the model.

Research question #3

Research question #3: *How do veteran adjunct faculty, who teach in the natural sciences, self-identify their current level of pedagogical skill along the Dreyfus and Dreyfus (1980) Novice to Expert skill model?* Only one participant, Sofia, currently identified as being a proficient teacher. Three participants, Natasha, Wanda, and Melinda, identified as experts, but rather reluctantly. The other three, Rachel, Philip, and Malcolm, all identified readily with being an expert teacher. Two interesting patterns were revealed in the course of the interviews, the first being that several of the women participants underestimated themselves. Some that described ways in which they were experts were reluctant to place that title on themselves, and Sofia, who did show some expert characteristics, readily identified as proficient. The second finding of interest was that two of the participants, Malcolm and Melinda, identified as experts - Melinda somewhat reluctantly - but in their descriptions of their teaching, didn't really describe expert characteristics based on the Novice-to-Expert Skill Development Model (Berliner, 2004; Dreyfus & Dreyfus, 1980).

Imposter syndrome in women adjuncts.

All of the women, save for Rachel, appeared to have underestimated their skills as teachers. Rachel was the only one who succinctly replied when asked where she felt she was currently on the model, "Oh, I'm expert," and proceeded to highlight many of the ways that she was an expert. The others were much more reluctant to say that they were an expert. Melinda replied, when asked where she fell on the model, "I

don't know, I hate saying I'm an expert. But I do think I'm somewhat of a professional expert." Wanda, who had a very confident presence while we spoke, said, "Oh my ego jumps right to expert, but I'm sure it's not." Natasha had a difficult time determining whether she was proficient or expert, stating:

> Umm… I think I'm proficient….Probably. And I would say only because I'm, yeah, I don't know. I'm not comfortable giving myself - I think I'm probably an expert by these criteria, however, I don't know I would ever, ever term myself as an expert in teaching. Right?...So if I was just looking at this and it was like, "Do you do this in your classes?" Absolutely yes. I think I'm probably more consistently in this expert column. But because the context is around education and teaching, I just don't think, I mean I look at my friends and people who are high school teachers, right? And years of education classes and all those things, I don't -- I'm not -- you know?

Sofia responded when asked where she felt she was currently on the model, "Well it was definitely not expert," despite describing several ways in which she could potentially consider herself an expert, but firmly planted her feet on identifying as proficient.

Based on the definition that an expert has been learning a topic for 10 years and over 10,000 hours (Dreyfus & Dreyfus, 1980), all of the women except Melinda have been teaching for more than 10 years and have probably put more than 10,000 hours into their teaching. Wanda has been teaching for approximately 30 years; Natasha and Rachel have taught several classes at a time for 12 to 15 years; Sofia has

taught fewer classes at a time for more than 10 years, which may influence her perception of where she exists in the model; and Melinda has only taught for six years.

This underestimation of their teaching abilities may be indicative of *imposter syndrome*, or the *imposter phenomenon*. First described by Clance and Imes (1978), the imposter phenomenon is an individual experience of self-perceived intellectual phoniness or fraud, and is fairly common among high-achieving women. The phenomenon is far more common and intense in women, as opposed to men, although men can also be afflicted by the phenomenon. Impostorism is intricately linked to an individual's inability to self-assess their performance (Kets de Vries, 2005; Want & Kleitman, 2006), but also to a lack of self-confidence and/or self-efficacy (Dahvlig, 2013). Impostors continuously overestimate the abilities of others they deem better than them, as well as underestimate the work that others put into their successes (Parkman, 2016). Natasha did this when she compared her teaching skills to the teaching skills of K-12 educator friends she has, thinking that their formal education in teaching puts them far ahead of her in terms of skills development, despite the differences in their teaching contexts. Early research into the imposter phenomenon indicated that self-deprecating humor was also indicative of impostorism (Kolligian & Sternberg, 1991), newer research shows that some people use impostorism as a self-presentation strategy, acting rather than feeling like an impostor (Ferrari & Thompson, 2006; McElwee and Yurak, 2007). Wanda was a good example of this, as she described employing a lot of self-deprecating humor into her classroom.

Impostorism is common among people who work in highly-competitive and stressful jobs (Hutchins, 2015). The imposter phenomenon has been described in

academia for decades, mostly due to the stressful "publish or perish" environment that exists in many institutions of higher education. While adjuncts are not necessarily subjected to the "publish or perish" mentality, they do work under stressful conditions, beginning courses at a moment's notice at times, never knowing whether they have a position from term to term, fear of being terminated if a problem arises and the administration doesn't side with them, and teaching without adequate supports in place. As also shown in this study, some adjuncts even are made to feel like "second-class citizens" which may add to their impostor mentality.

Brems, Baldwin, Davis and Namyniuk (1994) researched how impostorism impacted faculty behaviors in higher education and found that impostorism can influence the way faculty run their classrooms, including increasing the amount of lecturing done in class to avoid interacting with students who could reveal their lack of knowledge or leaving class early to avoid questions by students. For the participants in this study, where the apparent impostorism was focused mainly on their skills as a teacher, not on their content knowledge, it may explain the positive focus on self-drive, their own individual research into how to teach certain topics, rather than going outside to experts in teaching to guide them further. Natasha was very articulate about this, not wanting to attend a teaching conference because she felt like she had no idea what she should attend because she had very little knowledge of pedagogy as a discipline. It is possible that once she reached out and attended a conference, she might see how developed her teaching skills actually are, but without that outside influence, she feels like an impostor to those with formal teacher training.

Dunning-Kruger Effect in adjunct faculty.

Two of the participants identified as experts, but didn't really highlight examples of ways in which they were experts. Malcolm, who has been teaching for fourteen years, and does have a feel for being flexible and knowing his students, described his teaching style as content transmission. The only modifications that Malcolm has made to his course since he started teaching involved adding crossword puzzles to hone in on vocabulary, and he did mention convincing the department to purchase a working aquifer to help show how students how they function. Despite attending a conference on teaching, he dismissed being able to use some of teaching tools, saying, "A lot of it is really hard because we don't have all of the tools available either. I mean like [clickers]….Yes, I would love it honestly. Love it but they're not gonna have it here."

When asked why he thought himself an expert, he said it was because when he compared his results to another faculty member's exam that used similar test bank questions, his students got a higher grade. This indicated to him that his students knew the material better, when it probably highlighted how well they could recall only the very specific things he had pulled out of the textbook to teach them.

Melinda also identified, a little reluctantly, as an expert, but one thing that stood out to me as not an expert characteristic was that she felt that she was done modifying her science course for educators. She stated:

> ...I don't know how I could make any more changes. I'm really happy with the structure of the class now….I don't know if I would tweak it so much. Because I usually tweak it every semester. I usually ... My other class, Modern Science

> and Technology, I still feel like there could be room of improvement. But the Science for Educators [class], I'm feeling really good about the lecture material.

An expert always knows that there is room for improvement or change in a course. Melinda also described how she doesn't really acknowledge that there are secondary education students in her science for educators class, noting:

> There are some students that are going to be high school teachers or something not even….I usually get a review, sometimes at the end. And the ones that frustrate me are the ones that say, "Oh, well this was elementary science." I'm like, "Well that's what the course was." And I always tell them at the beginning of the class, I just want you guys to know, this is an elementary science class. So you will be learning information that you learned in elementary school.

I couldn't tell if this was an enrollment problem or if Melinda was actively ignoring an important group of students that were required to take her course, as secondary education majors. Either way, an expert teacher would encourage the secondary education students to take a different course or modify the course so that there was interest across the levels, as she would have a stronger relationship with her students and have a better idea of the needs of the student she serves. As stated above, Melinda was well under the 10-year threshold for being an expert teacher, and despite skipping over the novice stage because of her industry experience and raising her children, it hasn't been enough to push her forward into the expert stage.

Malcolm and Melinda may be exhibiting the Dunning-Kruger Effect. The Dunning-Kruger Effect is defined as "cognitive bias in which individuals, who are

unskilled at a particular task, believe themselves to possess above-average ability in performing the task," (Psychology Concepts, 2018, n.p.). Basically, everyone has ignorance in certain areas of their lives, but this ignorance is invisible to the person (Dunning, 2011). This is because the skills needed to remedy the ignorance of a domain, are the same skills needed to evaluate competence in that domain (Kruger & Dunning, 1999). As a result of this invisibility, people tend to believe that they are performing perfectly fine in the domain, perhaps even overstating their abilities.

Neither Malcolm nor Melinda had very much training at all in teaching, nor did they have any other feedback on their teaching other than from students, both having entered the profession after spending years in industry and not teaching as graduate students. As a result, they do have some ignorance as to how learning occurs, and to overcompensate for that ignorance, they overstate their abilities.

The important thing to note here, is that without some sort of intervention, both Malcolm and Melinda will go on ahead, continuing their teaching practices without changing them. It is here where we see the importance of checking in with adjunct faculty – neither Malcom nor Melinda were ever evaluated by their superiors. In terms of professional development, it is imperative that supervisors, like chairs and/or adjunct coordinators, take the time to evaluate adjunct teaching. Even better, chairs and coordinators that are doing the evaluating should at least have some knowledge of learning and/or pedagogy, or recruit the help of knowledgeable persons on campus to help.

Research question #4.

Research Questions #4: *What do veteran adjunct faculty, who teach in the natural sciences, perceive as factors that provided positive results in their development of higher pedagogical skills?* Participants in this study described several positive influences, including developing relationships with their peer colleagues, pursuing independent professional development on their own, attending trainings, workshops, and conferences, and having access to funding for professional development.

Developing relationships with peers

Developing relationships with peer instructors was one of the most common responses when asked about professional development. In this section, I consider peers to mean all instructors, not dependent on whether they are part- or full-time faculty members. Responses from the participants described a number of ways that they developed and took advantage of relationships with their peers, including sharing materials and expertise, striking up informal conversations, and participating in peer observations. Natasha really explained this well when she was talking about her lack of faith in student evaluations in determining her effectiveness as an instructor, stating:

> ...Network with my peers more, right? So I talk to them, my peers, like, what are you doing in your class, what works? And then sometimes I measure my effectiveness based on peers that I respect. If we do things similarly there's a chance that that's what "good" looks like.

Relationships with peer instructors, both full- and part-time, provide excellent resources and space to receive informal feedback on their own teaching approaches.

Sharing materials and expertise

Melinda and Rachel both described, early in their careers, reaching out to faculty members who had previously taught the class to see if they would share their course materials with them. Melinda taught a merchandising math course prior to teaching her science courses and compared having help with not having it:

> I actually did have notes from a professor who was also teaching a section of that, so that helped so I kind of went through….Did what they did, which is very rare, because the science courses that I taught, I had absolutely nothing.

Rachel also described getting help in her first courses, but not being overly thrilled with the approaches, even back then:

> I think I probably had spoken with other faculty members who had taught it before. I know I did. Some of the older people who aren't in the department anymore. And they were, you know, very helpful, very willing to help. But kind of rigid in their outlook on this this this this. You lecture at them and that's it.

In Rachel's case, she got some help, but certainly saw room to improve the way the course was taught.

Sharing materials with peers continued throughout the participants' careers. Philip spoke about making adjustments to a chemistry lab manual with his course coordination, stating:

> The guy who's my course coordinator now, the new full-timer, teaches opposite me….So we see each other all the time. And we talk. We go back and forth now on what changes we're going to make on the manual going forward,

> because he's got ideas for changing what [a former course coordinator] had been doing.

Sofia described hearing about a teaching resource through another faculty member and having it help her modify a teaching approach she used in her classroom:

> I had heard…from a faculty member that teaches here in the oceanography department that they had been given this book by someone here and they really liked it, so I bought it and read it. So for instance there's something called the "jigsaw" and I had been doing it wrong. So I read this book and I think, "Oh, that's why this doesn't work!"

Using a resource she would have not known about if not for a peer, Sofia was able to troubleshoot a practice she had been attempting for a while but couldn't get to work for her.

Wanda actually participated in sharing materials the other way, being a sharer of clicker technology. She described being introduced to clickers when she came back to one of her institutions after a period of absence. "It was when I came back here, the science department used them…. Yeah, they showed me how to use it, I talked to tech support in the classroom, I was like, 'This is great. It's a new toy.'" Wanda then turned around and shared clickers with the other institution she worked for, becoming known as "the tech genius," when in fact it was just a technique her peers hadn't been exposed to. Rachel also developed relationships with the other members of her department in order to supplement her class with hands-on activities, stating "Everybody is very good about [it], the micro guy gives me plates and I use the space from the [general bio] labs...I'll come around and say, 'Do you have any glassware I

can borrow?' I feel pretty comfortable with everybody in the department." Rachel also turns it around and helps others in her department, describing:

> I'm more than happy to be a team player as well. I was teaching human bio one year with a regular faculty, we were both doing it and we decided to start doing the blood typing and I'm a little anxious with kids poking themselves and bleeding so we had been talking about and I said, "Oh I'll come to your class to help you, you know, when you do it. So you have an extra set of hands," and I know he was really appreciative of that.

Sofia also developed relationships with peers outside of her department so that her students would benefit from her teaching, reaching out to some business faculty members:

> I wanted to get to know some of the business professors, so I could find out what they were learning in business about environmental stuff. And so I wrote to the department chair of the business school and she gave me a couple of names and so I initiated meetings with those people and one of them turned out to be really useful and he's mentoring some of my business students now in their project. He offered to help them out.

As seen above, sharing course materials, teaching materials, and even actual classroom materials like glassware, within and across departments is seen very much a positive by several of the participants.

Informal conversations

Having informal conversations with peers is also viewed positively by all of the participants, particularly regarding sharing stories about students or ideas in the classroom. Natasha spelled out how these informal conversations begin really nicely:

> It's the kind of stereotypical water-cooler coffee conversation. I do think, like, when I have those classes...that could have gone differently, I proactively seek out people who I respect their opinion and have been doing this a lot longer and I ask them questions, "Hey when this happens - what do you do with that?" and sometimes it's helpful and they're like, well I don't care. And other times it's like, "Yeah, yeah, that happens" So yeah...I would say that there are some times that are very calculated and premeditated that I'm looking for a resource and then other times it's like, you just happen to run into somebody and, "How's it going, haven't seen you, how's your semester? You should try this, right?"

Sofia identified "rubbing shoulders with other people who were trying to do the same thing" as one of the most influential types of professional development she has had. Philip described some of the conversations he's had with fellow faculty, stating, "We spend a lot of time talking in the evenings about where we want the course to go, and ways of teaching." Similarly, Rachel described talking with a peer with a unique background:

> She was on a committee looking at science education for the state. So, lower, not college but - and so every once and a while she and I have conversations about technique and ways of engaging students, things like that.

Melinda has taken a lot of advice from a fellow adjunct faculty member, describing:

> There's another adjunct faculty that I enjoy talking to, and he actually does have a certification, so he's adjunct but he's taught at a high school previously, so he's kind of retired. I enjoy discussing [things] with him because he also has so much to bring to the table, more than I do. And I think he's got cool tricks up his sleeves, so I enjoy talking with him….And then we always just compare about students and so on, "So what would you do in this situation or that situation?"

Malcolm has befriended a full-time faculty member that he believes has been very helpful in times that he's needed it:

> There's one professor in particular who has been so helpful. I mean she, I was having trouble with the exam reader. She actually walked up here. Her office is at the opposite end on the first floor. Walked up here, helped me, anything I've ever asked her, anything.

Wanda has developed a friendly rapport with her department head, stating, "I'll go and sit in his office and chat with him, and try not to talk politics, but sometimes it happens….We talk about attendance policies, and how students just want As." Wanda even extends her informal conversations to email, discussing her "problem students" with another faculty member. Going just a bit further, Rachel has developed relationships outside of her department, stating, "I have a friend here who's in the English department and I'm obviously biology department but I ask them how they deal with things. I seek out other people's opinions." Informal conversations, either between members of the same level (adjunct to adjunct), different levels (adjunct to full-time), different departments, or even through email, can lead to the sharing of

ideas and serve as a gripe session that can lead to troubleshooting problems in the classroom.

Peer observations

Natasha, Sofia, and Rachel each made it a point to mention that something that was really helpful for them in terms of developing peer relationships was observing their peers teaching. Sofia did this as part of her first teaching experience, because she was co-teaching a class:

> I went to all the classes that the other [taught]- we alternated - it was very strange. He'd teach a physics class then I would teach biology, it was very strange but I went to all his classes...because I wanted to learn and see what he was doing and see how his class was run.

Rachel also used peer observations early on in her career, being surprised that others didn't take advantage, stating:

> I used to run the freshman bio lab and one semester I took a section of it - I was teaching a section of it and I always went the day before my lab to hers to sit through it and I remember her saying to me that I was the only one who did this. So I would show up….I came ahead of time to run through it. And that could be my own insecurity.

Natasha used peer observations early in her career to not only figure how she wanted to teach, but also how she didn't want to teach, describing:

> I didn't have children, I was just recently married and I had some flexibility so I went and watched other faculty members, you know, to see how they were doing it or you know, that helped a little bit, then it was also like, more I would

> say, it helps recognize what you didn't want to do….Every institution that I've gone to I've asked if I could shadow someone because not to necessarily see what good looks like, but just to contextualize the course that that school has.

Sofia also observed a peer outside her field when she was involved with the K-12 program that trained teachers throughout the state, stating, "I wanted to meet the teachers and see what it was that [K-12 teacher educator] was doing with the teachers in the classroom, so I sat in on one semester to watch her." To these participants, taking a further step and observing peers in their own classrooms was immensely useful in helping them hone their own teaching practices.

Both Rachel and Wanda emphasized the benefits of getting many peers together in one space. For Rachel, it was confirmation that she wasn't alone, that even full-time faculty have difficulties:

> One of the older professors, this was a while ago - he was being, he was pretty frustrated with teaching and said something like, "Anybody interested in having like, a bag lunch discussion on teaching methods and things?" and I went to that, even though I didn't have a lot of expertise...and I found that comforting, to see these full-time faculty having a lot of the same issues that I had, not that I thought that just because they were full-time that they had all the answers, it's just, it was good to hear.

Wanda laments the fact that these types of interactions don't happen for her, stating:

> What I miss, that I had in graduate school that my husband has at [prestigious tech school], is getting together and talking over professional, what are people

studying, what are people working on? I would love to have a journal club….I would like that.

Pulling together a group of peers can clearly have value to part-time faculty, although is less spoken about.

Developing peer relationships can serve many purposes to a part-time faculty member. Peers can share materials, expertise, be a sounding board for common teaching gripes, and serve as a positive (or maybe even a negative) example for how part-time faculty want to teach.

Self-drive: Individual professional development

Another common theme that presented itself was the concept of self-drive, an intrinsic motivation to go beyond what they had done before in the classroom. Examples of this theme included researching teaching strategies and approaches off the internet, so as to not "reinvent the wheel," but also included some very unique resources that the participants used to help them develop as teachers in the classroom.

Researching teaching strategies on their own

Melinda identified her self-drive as the most important factor in her development, stating, "How I've changed as an instructor is I'm always teaching myself. I've always liked trying to learn and learn and learn, and then that has kind of changed the way [I teach]. All self-learning versus taking classes." Natasha described, even early on, having to create her own assignments because there really wasn't any other choice, noting:

> I would do worksheets with diagrams from the book and you know, like, guided things for them to do in class. But I had to create them from scratch because there was no support from the publishers. You didn't get anything.

Currently, in her anatomy classes, Natasha incorporates the use of case studies and said, "I use other people's. Like ones that come from the publisher, sometimes I make them up on my own." Sofia stated she used the internet as a resource to help her cover a topic she has difficulty with: "I'm always looking for ideas and a big topic right now is how do you teach climate change, so I'm always looking through all of that." Malcolm uses online resources to determine if someone has already figured out a way to teach a topic he has to cover, stating, "I always look for you know, like how has another person…What the heck's he throwing in there? How have others taught this?...If it's a thing that I know will be hard, all right, I want, you know, how have others taught it?" Rachel also uses the internet, stating, "I do use the internet, I have to say is that something I find, though, that I'll even be looking at high school level stuff on the internet and I'll adapt it for them," revealing that it is not just post-secondary resources adjuncts are using to find teaching tips. Wanda listed a handful of resources she uses online, and also how she interacts with the creators of those resources:

> McGill Office of Science and Society….He just sent out a weekly newsletter and he answered my question on how come melatonin is being sold over the counter even though it's a hormone. And that's because it's normally present in certain vegetables and fruits. So, that's how come they can sell it.

Not only does Wanda pose questions to some of her resources, she has worked with some online personalities to pilot apps with her students that a relevant to the course

content, stating, “The Nutrition Diva….Yeah, she had something on apps she developed called The Nutrition GPA that I helped her pilot in my class one semester.” Philip also spent a lot of time online researching how to best create questions for online homework assignments and quizzes in his chemistry classes, describing his situation:

> But, figuring out how to get Moodle to do something like, how do you have a student give you a Lewis structure in a system that does not let you do drawings?... Right, figuring out how to do all of that online.

All of the participants relied upon using outside, online resources to help further their teaching skills. Given the sometimes isolating nature of being an adjunct, which will be described in the next section, individually researching the information they need from online resources clearly has value to many adjunct instructors.

Using unusual resources for teaching

A surprising finding of this research was a list of some of the more unusual resources that the participants had used to develop their skills. Melinda was so excited about having learned about 3D printing and using it in her classroom, but where she learned it and used it was a little unusual, describing her favorite resources:

> I look at so many things and see which one that I feel is good. And like the 3D [printing] was like the [local public] library, because they were offering classes….So they had free courses to teach you how to do that, so I attended all the courses….And if you attend the courses you can do 3D printing for free, so yeah, so I did that.

Melinda used her local public library to first learn about 3D printing, but she also uses the resource to supplement a content area on 3D printing where the students design and get to make their models using the local library hardware. Sofia learned a great many teaching tips and techniques during her time working with the K-12 outreach program for science teachers. Many of her most popular activities were drawn straight from elementary or middle school curriculums and modified for college students. She described two activities, both from an elementary curriculum. The first she described from her first course:

> The terrarium connected to an aquarium so the aquarium drips down into the terrarium and you can imagine how excited I was about that. Think about the Narragansett Bay watershed. So it was like a mini watershed….And I essentially just lifted it from the fifth-grade curriculum in terms of what creatures you would put in there. You would put in different algae and snails and aquatic parts, I remember that better. Crickets and plants and all this kind of stuff. And then you did a mini-pollution experiment.

The second activity came from her current environmental biology course:

> We did a team contest on who could find the most different tree species by identifying or looking at the leaves and proving to each other and to other teams that these were different species of trees. So we learned what a species was and a genus and you know all that kind of stuff….They really enjoyed that. So we spent a lot of time outside collecting and looking at leaves. I have to admit that I got that activity also from, I think, the third grade activity that I participated in in one of my things and I modified it.

Melinda also admitted to modifying activities from an elementary curriculum for her science for educators class, except that her resource was her own kids' assignments, stating, "Some labs I knew my kids did. For instance we learned about Pangaea, so I actually had it broken up into puzzles and had them put it together." Philip also used a resource geared toward a slightly younger crowd:

> And looking for, even looking at more general, lower-level kind of science books. One of the things I've been taking a look at was, I found, on eBay, the chemistry set I used to have….But the manual is about that thick, and I remember some of the experiments. And flipping through that to see there's demonstrations, things like that, looking for demos.

Rachel also turned to her children for inspiration, but not as a resource to find a way to teach something, but more as a mental resource, stating:

> My youngest just graduated college, so I had someone in school for the last many, my youngest and that's three kids through college so I've always been asking them, "Is this fair?" [or] "What would you say if a professor said this?"…I found they're a good resource.

It is pretty clear that adjunct instructors will use any and all resources available to them, not just online, to push forward their own learning.

Regarding motivation to seek resources out on their own, Natasha and Wanda both had interesting perspectives on why they personally go out and find resources. Natasha very eloquently stated:

> So I think it was like a self-drive kind of thing of my fundamental, so I guess I knew me, I knew my reality as an adjunct reality and I think for me it was, how

> do I differentiate myself to be valuable, right? Within a means that's okay to me economically and time management wise. So I think some of it is just my personality, I don't do my best job when I'm complacent. So in order for me to feel like, like what I said to you earlier, like I'm getting challenge out of it, I needed to integrate myself into the culture that I knew was going to be my professional culture. So I knew that about myself. I knew my students would challenge me but not enough to make me want to do better and then the second piece of that I think is um, is, like differentiate, making yourself valuable in a professional setting. To me that's gratifying professionally, um, outside of the students. Even when I was in R&D, right, like how do I make myself, right, more, I guess, less dispensable? Right?...So more the resourceful you are, the more knowledgeable you are, then the more value you add, right? So yeah, I think that was when I realized that okay, this is kind of going to be my gig, right, so how do I make myself satisfied and valuable?

Wanda on the other hand, when asked what motivated her to incorporate changes into her classroom, stated bluntly:

> Well, for me, because I'm bored….I got bored, and one summer, I just made a bunch of videos. Honestly, it's for me, because I get bored. I contact the ... Like, I'm meeting with somebody I guess next week, from Cengage to find out how to use a new toy that they have.

Both Natasha and Wanda's self-drive is motivated differently, quite possibly tied to their motivations for being an adjunct in the first place, or a difference in their career trajectory, but nevertheless it is clear that adjuncts value resources that they can access

themselves on their own timetable, and those resources do have a positive influence on the development of their teaching skills.

Independent professional development is a commonly cited form of professional development in the literature for full-time faculty as well. Bowma-Gearhart (2008) cited consultation of teaching resource material as the second most common form of professional development that full-time science faculty pursue. Durso (2011) reflects on her independent growth as a teacher in her reflection described in more detail in Chapter 2. It has also been cited as an important aspect of professional development by Sherer and colleagues (2003) and Sunal and colleagues (2001).

Funding

A few of the participants mentioned having access to funds or advocating for funds has having a positive impact on their pedagogical development. Wanda and Philip had access to professional development funds through their collective bargaining agreements as part of the union structure at their institutions. Rachel, Malcolm, and Wanda all appealed to their supervisors and advocated for money to be used in their classrooms and on their professional development. Natasha participated in a grant-funded professional development fellowship offered through her institution.

Wanda took the most advantage of her professional development money afforded to her through her union's collective bargaining agreement. First, she purchased software to make her life a bit easier when making exams, describing, "I forget who had ExamPro, but it's a test generator….[Publisher] doesn't have that any more. I just bought it for $100, but I got my professional development money at [4-

year institution] to pay for it." She also used her money to stay current in the field of nutrition, stating, "Last year I used it for CEUs (continuing education units). Then Nutrition Dimensions, I think they have these booklets, or 15, I'm supposed to maintain professional accreditation." This year, she was excited to use her fund to head to conference on science skepticism, stating: I'm going to this Northeastern Conference on Science and Skepticism in July thanks to my professional development funds." At first, she had a little sticker shock when she saw the price of the conference, but once she realized she could use funds for it, she decided to go for it:

> The conference I'm going to, when they first started, you could buy a pass for $1,000, it was like the early ... I'm like, "Oh my God. I'm never going to be able to go to this." But that was starting on Thursday and it included all these different things. But, the registration was $270, so I'm going in on Friday, and then on Saturday, then I'll come back Sunday….And I was looking, and I'm thrilled to use the money for this. We've had this benefit for two years.

Wanda made good use of the funds available to her, but was worried because, "Well, not enough of us are using it, and I'm afraid it's going to get taken away if people don't use it." She could be referring to educators like Philip, who also said he has access to professional development funds through the union at the community college he teaches at, but made no mention during our interview of ever accessing them

Rachel, Malcolm, and Wanda all mentioned during their interviews times when they had asked for funding. Rachel likes to attend seminars and workshops based on her area of content expertise, and figured it couldn't hurt to ask for some funds:

> My husband's a physician and sometimes I hear about lectures through the medical school and I'll go to that, one thing I signed up for was like a day seminar and I was going to go anyway and then I asked the chairman and he said, "Yeah, we'll pay." That kind of thing. If I see something that I think is relevant to the causes that I teach, I'll go.

Rachel also participated in a study abroad semester one term as a volunteer, describing:

> And you know, I still had to pay my way so I did a couple lectures on infectious disease like the ZIKA virus and it was just, it was just good timing anyway and then she had an extra set of hands and eyes on site for the students and they were doing some independent studies when we got to these ecosystems - eco stations around Costa Rica so it was fascinating for me. I was really excited to go with her….the dean ended up giving me some money for it, too.

Rachel volunteered to go, but as she presented information and acted as a second chaperone, her dean saw value in that and added some additional funds. Malcolm advocated for some funding to use to buy materials for his classroom, describing:

> I actually talked [four-year institution] into ordering me a working aquifer. They argued, "This is not a lab class." But I knew they were allowed $5,000 per class. [I said], "All I'm asking for is $2,300 here." I was persistent. If there's anything I can ... If you wanted to use one word that would be a description of who I am, it would be persistent. I don't stop, and I hounded

them. Now, for the last maybe five years, I lug the aquifer in, hook it all up, ask them all up, and I have them see how an aquifer operates.

Malcolm can now show his students how an aquifer operates using his model system that he persistently advocated for. Wanda also spent some time advocating for her second institution to order and use clicker technology that was being used at her first institution. When I asked if he had to fight for them, she replied, "I am always advocating for myself. I've never assumed ... And that's something that is an adjunct. I've never assumed that I have support, so when I do have support, I'm appreciative."

Natasha participated in professional development fellowship offered through her institution, where she learned the role-playing pedagogical approach called Reacting to the Past (RTTP):

> The heart of the grant is to recruit faculty members, so they opened up the application process, which included adjuncts, which they don't always….So part of the fellowship was that they would pay for your registration fees to go to the consortium that they do at Barnard where this guy - the RTTP is.

At the same time, Natasha actually criticized her lack of access to funding as the worst part of being an adjunct in terms of her professional development:

> You don't have professional development funds. And so a lot of it is on your own time and when you don't make a lot of money, I mean, it's an excuse right, cause obviously right, if I really wanted to I'd figure out a way to make it happen….There's lots of really good adjunct teachers who with given resources would be amazing but they don't have any resources so it's a job, it's

> a paycheck and you can't criticize them for that….I do what I can within my limitations.

It is clear that having access to funding, either as part of a union collective bargaining agreement, because of advocating for money to use for their own professional development, or participating in grant-funded programs offered by institutions, is important to most of the participants.

Workshops/Conferences

Several of the participants identified attending workshops and conferences that focused specifically on teaching, not content, and considered them to be helpful. Sofia mentioned a visiting professor who facilitated a workshop on campus that helped her with more active techniques in the classroom, saying, "The physics professor from [prestigious tech institution] who came here and gave a lecture on student response systems and think-pair-share, I do a lot more of that, which I never did." Melinda had just finished an online workshop course through her institution on how to become an online instructor and found it valuable to her development:

> The only other course that I've kind of taken is I've just recently taken an online course. And that was interesting as well because you hear what other instructors do. That was a good way to get feedback….It's how to teach online instead of face to face. So, I'm just certified. I haven't taught any online courses, but I can now do it.

Melinda mentioned a few ways in which learning about online education has helped her in her face-to-face courses:

> I don't know what it was called, it was like a doodle thing, and you actually write in and then sketch it out like. I think I applied that….So yeah, there was a lot of cool ideas. Kind of like, oh, that's kind of interesting.

Melinda also said that it helped her organize her courses as well, stating, "I think it helped me a lot with the structure and I kind of added that structure to the syllabus."

Malcolm described attending a regional teaching conference, and while he found it somewhat helpful, he was frustrated because of his limitations at his institution:

> I attended workshop that was actually involved in New England something or other [NEFDEC]…I was at it. I learned some things at it but….A lot of it is really hard because we don't have all of the tools available either.

Natasha also branched outside of her institution, and as mentioned above received funding to learn about a role-playing pedagogical approach:

> I went to a formal training this summer on the Reacting to the Past curriculum, which is a global curriculum. A global pedagogy. That was helpful, even though I haven't implemented it because I don't teach the course. And it's not applicable anymore. But learning the ideology behind the, listening to the person who created that pedagogy in that he did solely at Barnard because he walked, I mean, his story is a lot of stories. He was walking to class one day and he thought, he said he had been teaching for about five years and he was getting ready to do another class and he thought, 'I can't do this for the next 40 years of my life, I just can't do this. How am I going to engage my students and make myself feel satisfied?' And so he came up with, that's where

> "Reacting to the Past" was born. I think that happens to a lot of professionals, right? And so that one was really helpful, even though I'd like to implement it at some point because I think it'd be really fun. Awkwardly fun. I'm not a roleplayer but, so it took me out of my comfort zone, too, so yeah, I think that being involved in the sort of strategic conversations on a formal level, which is unusual for adjuncts. And then going to some conferences, which is also challenging for adjuncts because of the economics of it, helped a lot.

Natasha found value in attending the training, not just because of the pedagogy, but the story behind how the pedagogy was developed.

Some participants found value in attending teaching workshops and conferences, but not as much as expected. This is different from what full-time faculty in STEM departments found useful – Bouwma-Gearhart (2008) found that full-time faculty ranked workshops, courses, and seminar as their top choice in professional development.

Seeing the "big picture"

The last factor that a couple of the participants identified as positive, or potentially positive, was being able to see the "big picture," or being able to see their position in the grander vision of the university. It was only mentioned by Natasha and Rachel. Natasha volunteered as part of the curriculum development team for one of the general science courses she taught for a while, and found that working on that team was the most influential piece of professional development she had:

> I think being involved in curriculum development and those conversations on a formal level were really helpful, um, because I understood more about this

> institution's goals for the students….Yeah, the big picture, which I don't think adjuncts are ever privy to that. So I think that was really helpful. I do think now the culture has changed a little as a result in this institution involving adjuncts because know they disseminate that information to the adjuncts so, I think they realized that that was an important bridge to make and I think this place is unique for adjuncts anyway, so I think that the curriculum development stuff was probably the most influential.

Understanding the institutional goals of the institution and allowing the adjunct to be aware of that was something that Natasha valued, but was a unique experience for her as an adjunct because she was on that committee. It was not an experience all adjuncts at her institution were exposed to. On the other hand, Rachel lamented the fact that she did not get to see the big picture at her institution. When she was asked what part of being an adjunct limited her development, she responded:

> I don't do any advising. And, I think that leads to a connection and an understanding of the campus philosophy and thought process and I don't have. So, like if you know. On this campus everybody takes Civ - Western Civ and it is five semesters and it's a shared experience with all of them….And I think that if I advised students and I could get a better handle on that experience that….So I don't do any advising which leads back to the whole idea that one of the things I like the best is talking to the students. So for me, that is a problem. I don't have to, to do the, the a lot of the politics in departments or the politics in the college, that doesn't really faze me and that's a nice thing but

> the downside is that I think I have more of a limited interaction with the students.

For Rachel, she is aware that there is a "big picture" she is ignorant of and feels that it would be more valuable, even as an adjunct, to take on a little more work advising students, just to understand that big picture. None of the other participants mentioned anything along these lines, potentially indicating that they have no idea of the "big pictures" in which they work.

Research question #5

Research Question #5: *What do veteran adjunct faculty, who teach in the natural sciences, perceive as factors that provided negative results in their development of higher pedagogical skills?* The factors that the participants identified as negative towards their pedagogical development had to do with the lack of support for their teaching. They identified that they: had little initial support when they started teaching as adjuncts, or even as graduate student teaching assistants, having to "learn by the seat of their pants"; they are rarely, if ever, observed while teaching by superiors; the workshops that they have attended are mechanical and forgettable; and that they are not formally trained in education. Several of them also identified some of the common pitfalls of being an adjunct, including the timing of their schedule and their "second-class citizen" role in the department.

Lack of teaching support

Many of the participants cited a lack of support for their teaching as a negative factor in their development. This ranged from "being thrown in the classroom" with

very little direction, even as graduate teaching assistants, to not being observed by superiors, to being offered mechanical or forgettable trainings and workshops. A couple participants even identified that they were not formally trained in education.

Being "thrown in the classroom"

Several of the participants described their first teaching experiences as being less than stellar because they weren't given a lot of support in their first classrooms. For some, this went all the way back to their first teaching experiences as graduate teaching assistants. It was Philip who described his teaching assistant position as, "They throw you in the classroom." Natasha also had a less than exemplary teaching experience as a graduate student:

> I got the syllabus and that was it. And I mean, I had my previous experience as a student I guess, but no formal… yeah. The instructor didn't say, "This is what my objective is and how long they should be there."

Sofia also stated that she had no support as a graduate student, recalling:

> I didn't ever teach, I was a lab assistant in one course. But I was not in charge of the course or anything. Research or lab assistant. Whatever it was…You know it was so long ago I don't remember if I actually taught it or just set things up -- I did not have much responsibility.

And when asked if she felt she had support as a teacher in graduate school, Sofia replied, "Nope, none whatsoever." Malcolm and Melinda did not teach in graduate school, and only Wanda took a specific course on teaching as a graduate student. Rachel did not say anything positive or negative about her graduate teaching experience.

The feeling of “being thrown in the classroom” continued for many of the participants as they began their professional teaching careers as adjuncts. Natasha described her first experience as isolating.“First semester I didn’t know anybody. I just showed up. Like, here’s what you’re teaching, here’s your classroom, have fun.” Sofia had a similar experience in her first professional teaching position, which was a general science night class. She recalled:

> But then, of course, I was on my own and I don’t believe he [co-teacher] came to my classes. You know, it was, um, fascinating. Learning by the seat of your pants, just seeing how things went, getting to know the students. It’s very interesting because they were non-traditional students and they taught me a lot, I would say.

Melinda recalled not having any direction in terms of curriculum to follow in her first science courses:

> The science courses that I taught, I had absolutely nothing….There was no curriculum. I didn't know what I had to meet. I think maybe a year later, into it, they actually did say, oh, you know you need to follow the STEM thing. It's not that I wasn't...I was already applying the STEM, that was because I sort of knew that from my kids that I should be doing that. But no, there was no guidance about things or topics you need to cover, and there's still kind of no guidance, I just know that I need to follow ... because I know they're taking a test and I'm just fortunate that I have kids that go through elementary school so I sort of know the curriculum.

In Melinda's case, she feels that she still lacks guidance in terms of what she is supposed to teach, even six year after starting.

Spotty observations by superiors

Four of the participants had never been observed by a superior, either a chair or a dean, in their careers. When asked if they had ever been observed, Malcolm responded, "Haven't," Philip responded, "No. I've never had anybody come in and observe me." Melinda replied, "No. I don't know if I would like that. No." and Sofia recalled when asked, "No. And they don't…I have never been offered."

Rachel, Natasha, and Wanda had been formally observed by a superior, but none of them really found the experience particularly helpful in terms of development. Rachel recalled when asked if she had been observed, "That's a good question. I think yes, I think the chairman sat in once." When asked if she got any feedback, she replied, "No. Not really." Wanda has been observed a few times, but the feedback that she got was minimal at best. She recalled:

> Yeah, this one woman, I remember, it was at [four-year institution], [she] hasn't been here for a while. I slept horribly, and I knew I did horribly. And I talked to her afterwards and she was like, "Why do you want me to evaluate you? We know you're one of our better teachers." I said, "Because, maybe there's something else I can improve."

She described another instance with a different observer:

> I mean, this one guy, he was head of the department at the time, and for some reason, when he came into my classroom, he was totally awed by the fact that I told ... That the class started, and I went like this, and students took their hats

> off. I didn't have to say anything, they took their hats off. But that's because for the first three weeks, I'm doing this. Take your hats off, take your hats off. It's Pavlovian, you know? He was so impressed with that, so I'm like, okay.

Natasha has also been observed a few times in her career, although not at the first institution she worked at. Natasha was, however, pretty critical of the observation process as a whole. When asked about her first observation, which was at a community college she worked at concurrently with her current institution, and the feedback she received, she recalled:

> It was a rubric, and then notes...which is sort of funny because he's a scientist so I'm not sure he was any more qualified to evaluate the effectiveness of a teacher but the rubric helped, right, you know? So, I mean, yeah.

She was then observed every term that she taught at the community college by the dean or a representative of his office. When asked if the continued observations were useful, she replied, "No." She continued:

> I shouldn't say it wasn't useful. Minimally useful… because… it never was feedback that was applicable for the course. It was always for jobs that one hour time slot of your three hours a week or whatever, so, useful in the sense of okay, maybe you're not projecting your voice loud enough for people to hear you, you know, mechanical things, but as far as like, are you… is your course effective and useful to your students? It's not useful because there was no collection of artifacts or any of that. So um, yeah, technically useful but not.

When asked about being evaluated at her current four-year institution, Natasha had some more positives, but still wasn't overly impressed with the feedback:

> I think they're, yeah, I think they're helpful. It definitely - I think [Dean of General Education] is more, has been the most helpful because he has a lot of context on application of education principles so I would say that out of the all of them he was the most useful, but a lot of it too was mechanical, right? Like how to make things more engaging, not the actual what those things are didn't exist. Right, like, the students are expecting you to do this, right, so don't do that, right? Like it was more mechanical stuff.

But she did see the value in the dean's perspectives:

> I think it's more about two people and having a conversation. Saying, this is what I've done in my classes that work, so he's in the position to observe multiple people that you and I don't. Like, I've seen people do this and it works, so it's sort of like bit practices that you and I don't see in our own classrooms.

Despite Natasha's somewhat negative experiences with observations, she can understand the need for the observation process, with a qualification:

> I think that the evaluations are an important checkpoint, they keep it real and kind of keep you grounded on what the administrative objectives are so you're not kind of going rouge but um, as far as like, actually executing teaching I think it goes back to what we're sort of - the side conversation of - I don't know that the people who have evaluated me have a ton of background in what it means to be.

It is clear from the evidence above that observations by superiors happen infrequently, if ever, in an adjunct's career, and as evidenced by those that have been observed,

those occurrences don't have a lot of impact on the development of pedagogical skills. As Natasha stated above, observations serve as an important checkpoint and should be done on a regular basis to keep faculty from perpetuating practices that are not effective in the classroom. The problem with them currently, is that they aren't being done with any regularity – take for instance Rachel who has worked for her institution for 15 years and has been observed teaching once. What tools for evaluation are chairs and supervisors using, if not observations? Are they relying on student evaluations, which have been shown to be biased again women (Boring, 2017; MacNell, Driscoll, & Hunt, 2017, Sprague & Massoni, 2005) and people of color (Reid, 2010)? Or are they relying solely on the grade outputs of the faculty? Observations and debriefing may be the best evaluation technique for evaluating faculty on teaching, but it is used so infrequently that it becomes ineffective.

Mechanical and forgettable trainings/workshops

Several of the participants identified attending trainings or workshops put on by their institution's equivalent to a center for teaching and learning. For most of them, they found the workshops mechanical or practical in nature – really only covering topics like how to use a learning management system – or wholly forgettable.

Philip mentioned that the professional development help he sought out was actually the mechanical workshops, recalling, "Things I sought out were, okay, how can I use, how do I use Blackboard….Technical development. In terms of engaging with students, I've never ... I don't know, maybe I got lucky. I was good at it." He also mentioned that at the four-year institution he works for he doesn't participate in the trainings: "I've never really felt the need to go there. Because a lot of it is stuff, you

know, it is how to use Blackboard." Philip admits that he hasn't "been paying attention" to whether his institutions have centers dedicated to teaching and learning, but he does get emails from his community college:

> And occasionally, there are some courses. I can't really point my fingers at any of them, because most of the time, those are the emails that just get….Well, I glance at and say yes, but this is not something that I feel like I need to do right now. I think maybe if I had been offered the stuff early, the first time, the first time I was teaching, yes, I would have gone.

At that point in Philip's career, the mechanical workshops are useful, but the other workshops seem like they could have been more useful to him earlier in his career. Rachel did attend sessions that were more mechanical in nature:

> So yes, I do have access to that and even the Sakai which is their Blackboard, there's always opportunities to go and I did go to that - I had to learn to use that I had to use it for different ways of teaching and different activities and have people respond to a reading- so I have taken advantage of them….More of, way of using some of the…How could you use this technology in your classroom? You know, what is it capable of? So, I have gone to that. It usually comes across in an email through the school who operates things like that.

It was interesting to note that when Rachel was asked about workshops and training, she had initially forgotten about those types of programs. Sofia also described some of the workshops offered to her as mechanical and not very useful:

> Some of them were just practical, like how to use the electronic classroom system….Um, what did I do? I really haven't gone to that many. Some of them

> are mixers where you actually meet other faculty members specifically to find out what they're doing and how their course might relate to yours.

When asked if those mixers were useful to her, she replied "Um, I actually made it - took it upon myself - because they weren't that useful." It was at that point she made connections with business professors to enhance her classes made up of primarily business students. She also found that even when she held a full-time position at her current institution as a laboratory instructor, she found the offered professional development lacking. When asked if she had support in that position, she replied, "No, none, none, none. There would have been for maybe if you were teaching a course that wasn't a lab, they had stuff. But it didn't relate to the lab. It wasn't helpful."

Melinda described an onboarding program that consisted of a set of workshops that she took when she began teaching at her current institution. '"They did in the beginning….Yeah, they actually offer five professional development courses. So that was six years ago, and I kind of don't remember the topics." When asked if they were useful, she replied:

> I'm not sure. All I can remember is that I felt that it was more about the student body than it was about the faculty. I think that's what I kind of got out of it, like work around the students, work around the students. I sort of got that kind of message.

She did mention that there was an incentive to take the courses. "It was optional but they kind of recommend you to take it, and then they actually do pay you to take those courses….So I think that's why faculty do take it." She did reflect that it may be more useful now that she has an idea of her position, stating, "I mean, it might be more

valuable for me to take it again, but then there's no pay incentive so why would I do it again?" Melinda, like Philip, really thought that she didn't really need professional development for her teaching, and wanted to focus on other areas of her life:

> I need to be spending that time more of like, how do I make more money? I don't want to just do this. I have to do something else….I'd rather do professional development in other areas than in what I'm in currently. I feel like I'm okay there. Do I need to professionally ... I mean I always have to keep it fresh and so on, and I do. But in terms of what more can I learn for these courses, I'd rather put my focus professional development in other areas.

It is clear from the evidence above that while some of the participants participate in trainings and workshops offered by their institutions, on the whole they are not very useful and sometimes forgettable. There was also evidence, for some of the participants, that formal professional development of their teaching was not a priority right now in their careers.

Not formally trained in education

Two of the participants highlighted the fact that they are trained scientists, not trained educators. Rachel mentioned this when she was describing a switch in courses she taught:

> I stopped teaching cell and [molecular biology] because they added a writing component to it. They decide to make it count, available for students who wanted to count their writing requirement and I did not want to grade….Besides which, I can write okay, but that's not my training and I didn't want to be correcting people's English. I didn't feel qualified to do it.

Rachel has never been trained to grade someone's writing and didn't feel comfortable stretching beyond her training for a course. Natasha seemed to be the participant most aware of the fact that she is not formally trained as an educator. She reflected on her discovery of the word pedagogy:

> I recognize the importance of like, developing myself professionally as a teacher because I am a teacher. So, you know, in trying to do new trainings on different curriculum or pedagogy or things like that, where I don't think I even knew that things like that existed when I first started. In fact I know I didn't, I don't think I even knew people used that word. And I obviously don't use it that well even now. Of course that's not that I use it well even now. I think that being engaged in the process, I didn't even know there was a process until I started to.

For Natasha, she felt she is still very much in the learning phase of what pedagogy actually is and what it entails to become an expert in pedagogy. She mentioned her lack of training when asked about her first teaching experience and her feelings during that time:

> It was really uncomfortable in that it rationally you know you're very well trained to teach the material. So it wasn't that I second guessed my knowledge in biology, but [I was] definitely not well-trained to educate people in the material, in how to effectively teach this. So, terrifying in that regard.

She also finds that her lack of training in education limits her in terms of professional development, especially in regards to attending conferences. When asked why she doesn't attend conferences, Natasha mentions common limitations that adjuncts face,

but expands on it. “I mean money, time, and just honestly, probably total ignorance of even what would be appropriate for me to attend. I wouldn’t even know, like, where I would want to go or what I would want to do.”

Adjunct pitfalls

Some of the participants identified commonly cited pitfalls that adjuncts face as negative factors towards their development, including the unfortunate timing of their schedules and the fact that they sometimes feel they are “second-class citizens.”

Timing of their schedules

Several of the participants mentioned the timing of their schedules to negatively impact their development, either because they don’t get to interact with peers or supervisors often, or because their teaching schedules conflict with workshops being held on campus. Philip mentioned that he doesn’t know as many of his adjunct peers at the four-year institution he teaches for mainly because of his schedule: “I don't know as many of the adjuncts over at [four-year institution] because it sort ... the schedules sort of don't line up….And I'm not there as much compared to [community college].” Melinda also mentioned not connecting with her peers, both full-time and adjuncts. When asked why those connections don’t happen, she explained:

> I think it's because I'm mainly in the classroom versus in the whole office….Only time I'm there is that I have to make copies or, for someone. But I don't know….And it could also be a time thing too. I think there's a lot of adjuncts, but we're all on different [schedules].

Natasha remembered early on in her career where teaching a night class impacted her connections:

> I mean there was a department chair who hired me but I never saw him after he hired me because it was a night class. So his office was locked by the time I got there. He was available if I had questions.

She also reflected on what happened when her schedule changed days of the week, stating, "I switched from a Monday/Wednesday/Friday to a Tuesday/Thursday and it was like a different world when you know, like, what faculty are around."

For Wanda, her class schedule impacts her ability to participate in formal workshops and trainings, as well as faculty meetings:

> They may offer things, I just ... First of all, at [second four-year institution] I teach at 3:30 and at 5, on Tuesdays and Thursdays, so that's a sucky time….And my office are hours are right before my 3:30 class and open period, or something, so that's when faculty have meetings, but I don't have to go because I don't have time to, and I have an excuse because it's my office hours….I'm here on my days that I have to teach.

Melinda also found that the timing of workshops didn't fit into her schedule, or her life, because of other priorities such as her family. When asked about workshops offered regularly, she replied:

> They do, like I think in the evening there's some. I just don't go to those because again, it's not ... they don't pay. And usually I'd rather spend my time with my kid in activities or I actually tutor my kids a lot, so I'm like, they need me at home more than…I don't know what value I would get from that.

For these participants, the timing of their courses prevented them making meaningful connections, which as reported in Research Question 4 above, is one of the participants' most highly cited positive factors towards their development. They also found that their schedule, life, and the timing of workshops didn't really fit together in practice.

"Second-class citizens"

A few of the participants mentioned ways in which they felt that they weren't necessarily completely integrated into their departments or institutions. It was Rachel that said "I do feel a bit like a second-class citizen in the faculty level of it." But she also said that because she had been there for 15 years, "I do feel I know everybody and they appreciate what I bring to the table." For Philip, he was very frustrated by the fact that he wasn't offered office space at the four-year university he worked for. He compared working for two institutions:

> One thing that does frustrate me at [four-year institution] is there is no office space for adjuncts. The first time I taught there I was half expecting it so I just said can you get me some place where I can have some office hours? And they give you the key to one of the labs and I could sit in here and they never showed up. So I didn't even try this semester. But at [community college] again,...two thirds of the teachers at [community college] are adjuncts. Actually spaces for them but since the lab is right next to where I teach the lecture I can sit in the lab and work there. But one of the nice things about that is I can get people, I can teach more than ... I can have office hours with more than one person at a time and some of them can help each other so it's almost

like a study group….I get frustrated. That's one of the things I don't like about because it's hard for me to be at [four-year institution] to do office hours.

For Natasha, it was really more about knowing that she wasn't always going to be supported if she had a complaint and that impacted her relationships with full-time faculty:

> I think um, it's a hierarchy and I think as long as you're respectful of the hierarchy, this unspoken sort-of hierarchy then you - the relationships with the full-timers are fine. If you start to make too much noise about something that they don't feel as a group or cohort is appropriate, you feel a little alienated.

She continued:

> I think inherently, you are closer to your adjunct peers because you're in a similar situation and you're all fighting - I think - I do think here out of all the places I've taught is probably the most friendly and supportive, not so much about scheduling but I think other places are a little better about scheduling….but I do think there's a line. I do think there's an invisible line in the sand that if push came to shove, like, I'm the - sort of like, the permanent employee versus a temporary employee, right? If push comes to shove, I'm on the shove, not the push. So yeah, I think that kind of have - there's a level of reverence I think that some of us give them because we should. You know? I guess, um, some of them are like, don't like, you know, you can call me by my first name and some of them don't see us an equals and some of them don't see us as equals and if you don't see me as an equal then our relationship won't be productive, right?

These participants all identified aspects of their job that made them feel like second-class citizens, whether it was just not feeling supported or not having the access to space others in the department had, and for each, they perceived it as having a negative impact on their development.

It is important to note here that these are what the participants perceived themselves were negative factors in their development, and for some, they didn't see being an adjunct as having a negative impact. For Malcolm, when asked if there was any part of being an adjunct he found stunted his growth as a teacher, he replied, "No. I think the advantage of even hiring an adjunct is the majority of us have worked in the field for an unbelievable number of years, all right?" The same was true for Philip, who replied:

> I can't think of any….Because as long as I've been an adjunct, it's almost like I've been semi-retired….So, I've always had the time. There was nothing to prevent me from doing some of that other ... Unless there was a scheduling conflict or something, that I really that I really wanted to do, but I can't think of anything.

Sofia also responded similarly to the question: "I don't think so….I mean, I had such a free hand at [four-year institution] so maybe only that….There's a freedom I've had at [four-year institution] that I absolutely love." So for a few of the participants, they really didn't see any particular aspect of being an adjunct as having a negative impact on their development.

CHAPTER 5

CONCLUSION

The final chapter in this dissertation reports the following: a summary of the study, including its significance, design, and analysis of the data; conclusions and interpretations of the findings; limitations of the study, and suggestions for future research.

Summary of the Study

This research was inspired by the researcher's interest in the pedagogical choices of faculty in the natural sciences, as well as her own personal experiences with professional development as a long-term adjunct professor teaching in the natural sciences. As consistently reported by the popular media and academic news publications, there is an "adjunct crisis" in academia. Institutions have shifted into hiring more contingent (adjunct and non-tenure-track) positions to cover more sections of courses at a significantly lower cost, including pay and benefits, than tenure-track faculty (AAUP, 2017; Snyder, et al., 2016). Despite this "crisis," very little research has been conducted that focuses on adjunct faculty in general, even less in specific disciplines of study, and there have been even fewer studies highlighting the voices of adjunct faculty themselves.

The majority of research that focuses on adjunct faculty focuses on their effectiveness as instructors, mainly utilizing large-scale databases and quantitative research methods to determine if adjunct instructors are less effective than their full-time counterparts (Bettinger & Long, 2010; Bolge, 1995; Burgess & Samuels, 1999; Chen, 2012; David, et al., 1985; Deutsch, 2015; Eagan & Jaeger, 2008; Ehrenberg &

Zhang, 2005; Fedler, 1989; Harrington & Schibik, 2001; Jacoby, 2006; Jaeger & Eagan, 2009; Johnson, 2011; Landrum, 2009; MacArthur, 1999; McGuire, 1993; Muller, et al., 2013; Ronco & Cahill, 2004; Rossol-Allison, 2011; Sonner, 2000; Wallin, 2004; Wickun & Stanley, 2011). When taking the literature as a whole, the prevailing hypothesis that adjunct instructors are less effective is found to be inconclusive, as there are studies that show adjuncts perform worse, the same, or even sometimes better, on a number of metrics, including retention rates, graduation rates, and grades. It has also been found that the instructional practices of adjunct faculty are fairly similar to their full-time counterparts. Although the research does show that adjuncts tend to use collaborative and active techniques or learner-centered activities (Baldwin & Wawrzynski, 2011; Eagan, 2007; Leslie & Gappa, 2002; Schuetz, 2002; Umbach, 2007; Webb, et al., 2013) in the class a bit less than full-time faculty, several of the studies noted that knowledge of evidence-based approaches to teaching were low across both groups.

Research into the professional development activities afforded to adjunct professors shows a lack of professional development that focuses on teaching, instead focusing on onboarding faculty to new institutions and focusing mainly on mechanical topics, like how to use a learning management system. This is especially the case for adjunct instructors that work at four-year institutions, rather than two-year institutions such as community colleges, where a larger majority of the instructional faculty are adjuncts. The literature describes a few major professional development undertakings, including orientation programs at the beginning of the year for new adjuncts, semester- or year-long programs that include support from centers of teaching and

learning, and faculty learning communities, but overall, there is a dearth of research focusing on the teaching professional development of adjunct faculty at four-year institutions in general.

As one of the main focuses of this research was to understand how adjunct faculty develop their teaching skills over time, the Dreyfus and Dreyfus (1980) Novice to Expert Model of Skill Development was used as the theoretical framework of this research. The model illustrates growth over the course of one's experience in a particular domain and was modified and expanded by Berliner (2004) to describe the development of expertise in teaching. The model describes behaviors common to teachers in the novice, advanced beginner, competent, proficient, and expert stages of practice in the field of teaching.

This purpose of this study was to really focus on how adjunct instructors in the natural sciences develop expertise in teaching. The research questions that guided this research were:

1. How do veteran adjunct faculty, who teach in the natural sciences, describe their teaching?
2. How do veteran adjunct faculty, who teach in the natural sciences, describe their development of pedagogical skills along the Dreyfus and Dreyfus (1980) Novice to Expert Skill Model?
3. How do veteran adjunct faculty, who teach in the natural sciences, self-identify their current stage of pedagogical skill along the Dreyfus and Dreyfus (1980) Novice to Expert skill model?

4. What do veteran adjunct faculty, who teach in the natural sciences, perceive as factors that provided positive results in their development of higher pedagogical skills?
5. What do veteran adjunct faculty, who teach in the natural sciences, perceive as factors that provided negative results in their development of higher pedagogical skills?

To answer these questions, a qualitative multiple-case study was designed that purposefully sampled adjunct faculty that taught at four-year institutions with more than five years of teaching experience, no K-12 certification, and no formal education in the field of education. Seven participants were selected after their department chairs shared a recruitment survey. The participants subsequently participated in 60- to 90-minute interviews about their experiences as adjunct faculty. Course syllabi were also collected via email. Interview data was coded and categorized using the constant comparative method of data analysis developed by Glaser and Straus (1967). Member-checking was used to ensure that my interpretation of their experiences was trustworthy. Cross-case analysis was employed using the methodology described by Stake (2006). Individual cases were analyzed for recurring themes that were pertinent to the research questions, each new individual case building and being incorporated into a framework. Once all of the cases were analyzed and coded at least once, the existing framework was then used to reanalyze the interviews a second time, and themes were honed and simplified. The themes were then presented using the participants own words and phrases. A summary of the themes will be presented below, organized by research question.

Summary of Findings

This section of this dissertation will summarize the findings of the five research questions and draw conclusions based on those findings, linking them to the existing literature on the subject.

Research question #1

Research question #1 asks: *How do veteran adjunct faculty, who teach in the natural sciences, describe their teaching?* During the interviews, participants were asked questions reflecting on their past and current teaching, as well as what they think effective and ineffective instructors look like. Overwhelmingly, the participants responded that teaching in the sciences should be relevant and engaging, while also prioritizing developing personal connections with their students.

Making science relevant

Every participant made mention of the fact that science should be relevant to their students. Each of the participants had, at some point in their careers, taught non-majors students, and those experiences made it very clear to them that part of being an effective teacher is to make sure that students can access science at a level that is appropriate for them. For the participants in this study, it was important to them to make science relevant to their students. For some participants, this happened through the use of simple, relevant analogies that connect science concepts to the lived experiences of the students in the room. Many of the participants also responded that they employ current events and focus on topics that intersect with their students' lives in order to make sure that their content is relevant to their students. Rachel, Wanda,

and Melinda all take the idea of making science relevant for their students a step further and really focus their teaching around developing critical thinking skills.

Engaging students: Utilizing a variety of teaching practices

Another important indicator of effectiveness that the participants in this study described was whether or not their students were engaged in learning. All of the participants described using some form of alternative teaching practice in their classrooms at this point in their careers, however, nearly all of the participants described beginning their teaching careers using passive, teacher-centered techniques, such as employing lecturing or writing on a chalkboard or overhead projector as the only approach used in the classroom. The only exception to this was Sofia, who had significant experience with inquiry-based science education training while she was a scientific researcher. Each of the participants used a spectrum of alternative teaching practices, from very basic where Malcolm incorporated crosswords to work on vocabulary to Sofia who organized her course around inquiry-based, hands- on approaches.

Making personal connections with students

One of the major drawbacks to being an adjunct professor, some might say, is that adjuncts do not have the time to develop deep personal connections with their students. Several of the participants in this study made mention of the personal connections they make with their students in the classroom. The making of personal connections is a departure from the literature, where the underlying assumption is that adjunct faculty do not make connections.

Research question #2

Research question #2 asks: *How do veteran adjunct faculty, who teach in the natural sciences, describe their development of pedagogical skills along the Dreyfus and Dreyfus (1980) Novice to Expert Skill Model?* The second research question that guided this research was based on the Dreyfus and Dreyfus (1980) Novice to Expert Skill Model of development that was modified and expanded by Berliner (2004) to describe the development of teaching skills in teachers. Using a participant's responses to the interview questions, I was able to categorize particular characteristics of their teaching throughout their careers that highlighted their development of expertise over time. The participants were also asked to self-identify with the stage of development they felt they were at when they began teaching and currently. The following section will highlight the characteristics of each stage of development: novice, advanced beginner, competent, proficient, and expert, and how the participants identified with each stage. The characteristics of each stage are also summarized in Appendix A. Also included at the end of each stage are policy recommendations that would best serve teachers at that stage of development.

Novice stage

Not a single participant in this study self-identified as a novice when they began teaching their first classes professionally. While a few of them described novice behaviors, like Natasha describing standing in front of the board feeling confident that she knew enough about photosynthesis but had no idea how to actually go about teaching it, for the most part, by the time they were teachers of their own classes, the participants in this study had skipped over the novice stage of development.

Four of the participants in this study had experienced teaching in graduate school, but only one of those actually took a course in "how to teach." Several of the participants, even those who did not teach in graduate school, referred to teachers they had in their undergraduate and graduate programs that illustrated mostly "bad" teaching practices for them, and they decided they did not want to be like that. Another possible life experience that was cited by some of the participants was their experiences as parents. In this study, four of the participants identified that their experiences raising their kids taught them that the world isn't as black and white or concrete as you might wish that it was, which helped them decide what kind of a teacher they wanted to be.

Advanced beginner stage

The participants in this study described a lot of fear and uncertainty as they began their careers as advanced beginners. The highlights examples of being marginally effective as teachers, but also described how they missed critical details, like how teacher perception of a topic can influence student perception. They also described having difficulty dealing with challenging situations – like when student come to class smelling of drugs.

Competent stage

By the competent stage of development, teachers have developed their own "rules" to teach by, and they become emotionally invested in their performance in the classroom, because now it isn't the "rules" that will fail them, but their own choices (Berliner, 2004). At the same time, competent teachers begin to impose rigid rules so as to keep control of their classes, now that they are responsible for the "rules." By the

competent stage, teachers begin to see the impact of their teaching approaches on student learning, and because of that, they spend a lot of time trying to figure out what works to engage students, and what doesn't work. All of the participants in this study described the trial and error process and experiences that shaped their teaching approaches throughout their careers.

Proficient stage

A proficient teacher begins to react to situations with much more flexibility and situational awareness, but can still take a lot of time deliberating when decisions need to be made (Berliner, 2004). For example, Natasha began to see herself as an organizer of knowledge in her anatomy and physiology courses, because she realized that just repeating content to her students wasn't as effective as helping them understand how to organize the knowledge in their minds. Rachel also began to shift her pedagogies based on feedback from her students – really getting a feel for what they actually needed from her as an instructor. The participants in this study also began to release the inflexibility of competence, and planned for more flexibility in their courses to deal with situations that may come up – like a class not understanding the material during the first go round. Personal connections were also described, resulting in flexibility in terms of student interactions – those rigid rules weren't as rigid as before, because the students became people to the faculty.

Expert stage

Expert teachers think quickly on their feet, reacting to situations without thinking too hard about them. They also are completely aware of their situational context, having a good idea of the needs of the students that they serve. Expert

teachers also have a very good idea about their weaknesses and can account for them in the teaching. The participants in this study spent a lot of time describing the students they serve and the contexts in which they serve them, and detailed the flexibility with which they can switch contexts, like Philip who teaches two very different populations at a university versus a community college. Or like Rachel who, after meeting with a student, recognized an overreaction to a poor grade and helped the student through that situation. Or Malcolm and Wanda being very aware of students with mental health issues. . Expert teachers are also very aware of their limitations as a teacher, and typically "farm-out" topics to experts, or seek out professional development to help them with very specific needs – like Sofia really focusing on how to be a better discussion facilitator.

Research question #3

Research Question #3 asks: *How do veteran adjunct faculty, who teach in the natural sciences, self-identify their current stage of pedagogical skills along the Dreyfus and Dreyfus (1980) Novice to Expert Skill Model?* Six of the seven participants self-identified as experts, while one, Sofia, self-identified as proficient. Two interesting findings were revealed when focusing on this research question: 1) Most of the women adjunct faculty in this study at first underestimated their pedagogical skills before settling on expert after reading the list of expert characteristics, which could be indicative of Imposter Syndrome and 2) Two of the participants self-identified at the stage of expert, but based on their responses to interview questions, probably exist further down on the spectrum of skill development. One participant in particular, Malcolm, was very confident in his abilities as an

instructor based on grades and student feedback, but had never been formally observed as a teacher and didn't really give answers indicative of having expertise in teaching. This may illustrate the Dunning-Kruger effect.

Imposter syndrome in women adjuncts

One of the more interesting findings from this research included the fact that nearly all of the women interviewed were reluctant to consider themselves experts in teaching, despite describing expert practices in their current teaching and having more than 10 years of experience as teachers. This revealed itself in quotes from the women adjunct faculty stating that they were reluctant to say they were an expert in teaching because they knew other teachers that were better, or that they did not want to think they are experts because of their ego, but that it probably wasn't the case.

Dunning-Kruger Effect in adjunct faculty

This bias may have been illustrated by Malcolm, and to a certain extent Melinda. Both individuals self-identified as experts, but based on their responses to certain questions, they really didn't fit within the expert stage. Malcolm in particular was very confident in his abilities as a teacher, using only his students' grades and student evaluations as an indicator of his ability. When asked why he thought he was an expert, he described a situation where his students were more successful on a multiple choice exam than one of his colleague's students. He described using primarily a content transmission approach, being very clear to his students about the content he taught, and that it was his job to distill it down for them to memorize. To him, that was learning. Melinda was a little less extreme, mostly being very confident that her courses didn't need any more modifications in the way she taught them. She

was also a bit less confident, as she did waver a bit before settling on Expert. Neither individual had been observed by a superior, and because they had been left unchecked, they had the assumption that there was little to modify in regards to their teaching.

Research question #4

Research Questions #4 asks: *What do veteran adjunct faculty, who teach in the natural sciences, perceive as factors that provided positive results in their development of higher pedagogical skills?* The participants in this study were very clear that the positive factors that influenced their development of pedagogical skills were mostly peer interactions and an internal self-drive to find the best way to teach their content areas, as well as having access to funding of some sort. Secondarily, some did find formal workshops and trainings helpful, although many of the participants stated that the workshops and trainings they had attended were mechanical and forgettable, turning those experiences into negative factors. A few of the participants identified having a sense of the "big picture" and their role in the university as a whole, either through curriculum development or advising students, as a positive or potentially positive factor in their development of pedagogical skills.

Research question #5

Research Question #5 asks: *What do veteran adjunct faculty, who teach in the natural sciences, perceive as factors that provided negative results in their development of higher pedagogical skills?* The largest negative factor described was a lack of external support for their teaching, either because of "being thrown into the classroom" with no guidance as to how to run a classroom early on in their careers, spotty observations by superiors, insufficient trainings and workshops being offered to

them, as mentioned above, and not having formal education training. The participants did identify a couple of commonly cited adjunct pitfalls as negative factors as well, including the timing of their schedules, which did not allow them to interact with their peers as much as they might like, thwarting the positive factor described above. Some of the participants also identified feeling like a "second-class citizen" at times, either through a loss of office space or not feeling completely supported by their superiors should a challenge arise, which also negatively impacted their development.

Policy Implications and Recommendations

Policy recommendations based on skill development

This research has shown that adjunct faculty that teach in the natural sciences do in fact show a development of pedagogical skills along the Dreyfus and Dreyfus (1980) Novice-to-Expert Skill Development model. As such, adjunct faculty members that fall in any one of the five stages of development have different professional development needs based on that stage. Table 2 highlights the recommended sources of professional development for each stage and the following section offers explanations for those recommendations.

Table 2: *Recommended Professional Development for adjunct faculty in each stage of the Dreyfus and Dreyfus (1980) Novice-to-Expert Skill Development Model*

Stage	Recommended Professional Development
Novice	Onboarding, orientation, mechanical workshops (how to use a LMS, etc.), pedagogical workshops
Advanced Beginner	Mentoring programs
Competent	Institutional centers for teaching and learning: pedagogical workshops
Proficient	Long-form, semester-long courses or learning communities
Expert	Continuation of PD in all forms, take on mentorship role.

Novice adjunct faculty would absolutely benefit from what many institutions already do in terms of onboarding and orientations, both to orient the adjunct faculty member to the mission and goals of the institution (Easton, 2009; Renninger et al., 2007; Smith & Wright, 2000), allow the new faculty the opportunity to develop relationships with other members of the institution community (Smith & Wright, 2000), and to give them the tools to smooth out their first teaching experience in terms of mechanics (Smith & Wright, 2000). Orientations should include both mechanical workshops, like understanding the learning management systems, how to use email, and how to submit final grades, and pedagogical workshops that get adjunct faculty thinking about the type of teacher they want to be (Schwartz, 2007; Yee, 2007). Orientations and onboarding that include pedagogical development materials could help to fill in the gap in the "the rules" that novices utilize when they approach their teaching.

As the adjunct professors in this study, and quite possibly many adjunct professors in the profession come into teaching as advanced beginners, it is ideal that at this stage there is appropriate professional development to help deal with the characteristics indicative of advanced beginners, such as dealing with challenging students. Mentoring programs (Nanna, 2018; Peters & Boylston, 2006; Santisteban & Egues, 2014; Savage, Karp, & Logue, 2004) of incoming adjunct faculty could be particularly effective at this stage in their teaching development because the mentor could serve as a sounding board as necessary when the new adjunct encountered a difficult student or found themselves to not be as effective as they want to be. Huffstutler and Varnell (2004) also mentoring opportunities to combat the prevalence

of impostorism in academia today. As was reported in the findings chapter, peer interactions were very important to the participants in this study, especially in their first classes. Fostering a relationship between a veteran adjunct and an incoming adjunct could increase the likelihood of peer interactions that could help adjuncts navigate teaching in their early years.

It is at the competent stage of development where centers for teaching and learning and faculty development staff with expertise in pedagogy should become the most important source of professional development. Those with expertise in pedagogy can guide adjunct faculty through how learning occurs, and the best approaches to ensure learning happens in their classrooms. Instead, what was described a lot by the participants in this study, was a lot of individual professional development occurring through the use of the internet, which is not uncommon (Durso, 2011; Sherer et al. 2003; Sunal et al., 2001). Many of the participants described going online to see how other teachers had taught a particular concept and tried it out in their classrooms with modifications if necessary. Not only did professional development occur in a silo, with no pedagogical expertise to guide it, the adjunct faculty in this study also spent unnecessary time looking for information that may have been available to them through someone with expertise in pedagogy.

It may be at the proficient stage of development that professional development may need to move beyond simple workshops and seminars to the more long-form, semester-long workshops, courses, or learning communities (Barker & Mercier, 2007; Lambert & Cox, 2007; Webb, Wong, & Hubball, 2013). It is at this stage where major shifts in pedagogical thinking occur, and it would be helpful at this stage of

development to have long-term support systems in place so that an adjunct faculty member could rely on one person, or group of people, to help walk them through major changes in their classrooms.

At the expert level, one might assume that professional development may no longer be necessary, but that is far from the truth. Expert adjunct faculty would be a fantastic resource to tap into in terms of mentoring incoming adjunct faculty. Another part of the expert stage that the participants described was the ability to recognize their shortcomings and how to navigate around them. Wanda brought in guest speakers to cover content she wasn't an expert in, Rachel used video resources, and Sofia changed pedagogies to deal with her lack of discussion facilitation skills. Even experts need help to further develop their skills, and as described in Chapter 2, it is also part of being an expert to continuously seek out opportunities to further develop their skills (Bereiter & Scardamalia, 1993). Expert teachers also derive their knowledge from outside of their own experiences, seeking the help of other experts to guide their actions (Kreber, 2002). This just goes to show that professional development does not ever stop, nor should institutions feel that because someone has been teaching for a long time, they have no need for assistance.

Policy recommendations based on adjunct experiences

This next section will highlight policies that would help to enhance the positive experiences of the adjunct faculty in this study, as well as mitigate the negative factors that may have slowed their pedagogical growth.

Developing relationships with peers.

Institutions need to meet adjuncts where they are in terms of professional development. As mentioned above, adjuncts find value in peer interactions, including mixers, brown bag lunches, and other formally organized activities. It might be wise, for institutions to begin experimenting with such activities. A local institution, that I happen to work for, implemented a coffee hour once every two weeks in the library where faculty could mingle with staff from the institution's center for teaching and learning and with other faculty. It was a specific time and place to ask questions, share what they were doing in their own classrooms, and get feedback from peers, with the added benefit of crossing disciplines.

Dropping down a level, departments can implement similar activities, and typically do to share experiences regarding research. Organizing a monthly, bi-monthly, or even once-per-term opportunity for all faculty, both part-time and full-time, within the department to get together and share teaching experiences could be an effective way to encourage faculty to try new things in the classroom. Offering it more often and at different times could alleviate the fact that adjuncts teach at very different times as their full-time counterparts and allow them to attend at least some of the meetings.

Another peer interaction that was highly valued by the participants in this study was informal conversations with their peers, either part-time or full-time. This is where office space for adjuncts becomes important, not only for the use to aid students during office hours. Even if adjuncts are given a shared space, in the same areas as other adjuncts, or even better with full-time faculty, informal conversations should

spark naturally eventually. Instead, many adjuncts do not have space, even for office hours, and walk straight from their cars to their classrooms and back, or find other places on campus to work, therefore limiting the opportunities for informal peer conversations.

Also of value to some of the participants in this study were peer observations, or the ability to shadow another instructor, especially in their early teaching days. Departments should be encouraging new adjuncts to shadow veteran instructors of the courses the adjuncts will be teaching. This can happen while an adjunct is teaching a course concurrently. Natasha, Sofia, and Rachel all found having the ability to observe a seasoned teacher helpful to their development of skills. This is also something that doesn't need to be limited to new adjuncts. As teachers develop their skills and try new pedagogies, it would be helpful to encourage others to observe a class in action, as sometimes, even just sharing it in a mixer or brown-bag lunch isn't enough to encourage others to try it out.

Self-drive: Individual professional development

Another factor that the participants found positively impacted their pedagogical development was their internal self-drive, which for the most part manifested itself as spending a lot of time online, searching for different ways of teaching their particular content area. This is another place where institutions and departments can meet their adjuncts where they are. Adjunct do live a transient lifestyle for the most part, sometimes working for more than one institution and don't spend a lot of time on campus – they come to campus to teach and for office hours and then they leave. They don't get as much time to connect with their peers in person as

they might like, so there is little time to share interesting resources, and as such, adjunct faculty have to put in the leg work to identify good online teaching resources on their own. Departments can, and have, mitigated this through the use of their institutions' learning management systems, enrolling every member of a department, or even of a shared course, to a course page on the learning management system dedicated to sharing appropriate resources that anyone can add to. Institutions can also do as above, or create an easily-located website, for resources that could be helpful to any discipline institution-wide. Making sure that the page is continuously updated and organized, as well as identified to new, and even reminding current adjunct faculty could reduce some of the leg work put in by individual faculty members.

Funding.

Several of the participants in this study indicated that they changed an aspect of their teaching or participated in professional development most often when they had access to funding, either through departmental funds or professional development funds earmarked by collective bargaining agreements developed by their unions. Several of the participants described instances where they had merely asked for funding for teaching supplies, and to that all I can recommend to adjunct faculty is to ask for funds, with the worst outcome being that the request is declined. As to the second source of funding, union organization for adjuncts is on the increase, and adjunct faculty should be making sure that professional development is wrapped into the collective bargaining agreement. And then using the funds. Wanda indicated that she was nervous her professional development funds would be taken away under the next contract because her colleagues had not been using the funds.

Workshops/Conferences.

A few of the participants in this study had participated in workshops put on by their institutions, or had attended conferences. In regards to the workshops offered by institutions, adjuncts should be encouraged to attend, but it is imperative that those workshops be useful and valuable to the faculty, otherwise an institution runs the risk of pushing away faculty interested if the workshops are not up to par, as the participants in this study indicated how unhelpful workshops had been for them in the past. As for conferences, funding should be available, perhaps not on a yearly basis, perhaps not fully covering the cost of attending a conference, but should be available to help cover the cost of attending conferences. Without funding, it is likely, as Wanda indicated before she realized she could use professional development funds, that adjunct faculty will skip out on attending useful conferences. Between airfare, gas prices, food prices, hotel, and conference rates, an adjunct is very easily priced out of even the smallest conferences.

Seeing the "big picture."

It is vital that adjunct faculty become a part of the institutional systems for which they work, serving on committees and partaking in service. While it can help the adjunct develop that "big picture" of the institutional mission and values that will help their growth, it will obviously serve to aid the institution in their growth as well. As numbers of adjunct faculty rise, they become more and more a part of the higher education landscape and can serve as resources, bringing ideas from other institutions and industry into the fold. Leaving them in the dark, making them feel unconnected, is

not going to help them be better teachers. Adjunct faculty should feel like their voices count and are heard by those higher in the hierarchical scheme of academia.

Lack of Teaching Support.

"Being thrown in the classroom."

Several of the participants described the notion of "being thrown in the classroom" without any support structures, even as graduate student teaching assistants. We cannot expect that anyone with content knowledge is a capable teacher the first time they are put in a classroom. And yet, only one of the participants in this study was offered the opportunity to "learn how to teach" while in graduate school by taking a single course. Ideally, pedagogical development should be a significant part of any post-graduate degree program. With the higher education landscape changing as much as it is, with less tenure-track positions and more contingent positions, it is likely that unless students move into industry after graduation, they will likely hold a teaching position at some point in their career. Luckily, teaching professional development programs are on the rise in higher education, training graduate students in educational principles and pedagogies alongside their research training.

At the same time, adjunct instructors should not be "thrown into the classroom" without knowing what support systems are in place and can help them succeed. Peer observations, as mentioned above, serve as an excellent first step. Onboarding programs, like orientations can be helpful, even more so if they happen at a departmental level rather than an institutional level, as institutional level orientations tend to focus more on the mechanical aspects: email, human resources, grading, etc. Mentoring programs, connecting one individual with another single individual are also

helpful right at the beginning of an adjunct experience. Of course, this requires that adjuncts be hired on a timely basis, and not days before the course begins.

Spotty observations.

Observations are necessary to check adjunct faculty, especially if there is little informal communication happening as well. As talked about above, Malcolm and Melinda both overstate their abilities as teachers, and do so confidently. Neither had been observed, and perhaps an observation would trigger them to identify their ignorance of education principles and pedagogy to help them move upward on the spectrum to Expert. Observations also serve as a simple checkpoint to check the progress of an adjunct faculty member. Both Natasha and Melinda came from industry and both made mention of the lack of oversight of teachers in academia. Melinda actually said that the biggest downfall to being an adjunct was no indication of her growth as a teacher. The person most likely to responsible for this growth oversight would be a department chair or course coordinator, and observing a class with a short debrief once a year would serve as a checkpoint to an adjunct faculty member's development.

Mechanical and forgettable trainings/workshops.

It is important to note that every one of the participants had access to various types of professional development throughout their careers, including professional development opportunities provided through their institutions. Every participant described some type of institution-sponsored workshop or training that they had access to as an adjunct faculty member. This is a good sign, considering there are many adjunct faculty who do not have access to institution-sponsored activities. And yet, for

the most part, the participants in this study seemed apathetic and unconnected to the institutional supports. For some reason, the institutions are not meeting the specific needs of these adjuncts.

At this point in their careers, these adjuncts have been bored or found no use for the workshops/trainings provided to them by their home institutions. This may well be in fact to the notion that adjuncts are transient and appear to have a high turn-over rate, so centers for teaching and learning cater their workshops to an influx of new faculty every year. However, as mentioned in Chapter 1 approximately 30% of the adjunct work-force has worked for their current institutions for over 10 years, as was the case for 6 of the 7 participants in this study. The seventh participant had been working for her current institution for 6 years, so very well enmeshed into the institutional culture at that point. Several of the participants mentioned that the workshops were basic how-to trainings, like how to organize a learning management system. Trainings as such are important, especially to newcomers, but if that is the only type of professional development opportunity an institution offers, or even appears to offer, then it is not surprising when faculty of all levels don't seek out support.

Adjunct pitfalls.

Overwhelmingly, the participants in this study were very content with being adjunct faculty, and had very little to complain about in terms of the commonly held pitfalls of adjunct faculty. However, two adjunct pitfalls were identified by the participants in this study – the timing of their schedules and being treated as a "second-class citizen." Both of these pitfalls are remedied by the same

recommendations – recognizing the role that adjuncts play and that they are important members of an institution and deserve to be recognized as such.

All too often, it is easy to overlook that adjunct teach the classes full-time faculty don't want to teach, including early mornings, evenings, and weekends. They are not always available to attend professional development sessions scheduled at those times, and may not be able to attend others during the day due to other jobs. Obviously, it is impossible to accommodate everyone, but varying the times and days of professional development can serve to expose more adjuncts to more opportunities Nixon (2007).

As to the "second-class citizen" feeling, it is important for adjunct faculty to have the space to work and meet with students, but it is more important for adjunct faculty to feel valued and feel like their superiors have their back if/when things go awry. The more valuable an adjunct faculty member feels, the more likely they will put in more work to make themselves more valuable – a self-fulfilling prophecy. If they don't feel valued, they will likely step back and disconnect themselves from the job as much as they can, doing the bare minimum.

Limitations

There were several limitations to this research, one being the small number of participants. This could have been remedied by stretching out my recruitment area – I focused mainly on southern New England to send recruitment emails to department chairs. I did also use social media sources to try and recruit adjunct faculty nationwide, but none of those recruitment efforts resulted in any eligible participants based on the initial survey. All of my participants were geographically located in

southern New England as a result, including from Rhode Island, Massachusetts, and Connecticut. Based on informal social media conversations with other adjunct faculty across the nation, New England is one of the "better" places to be an adjunct in the country, as adjuncts are better paid and there are a lot of opportunities due to the large concentration of postsecondary institutions in the region. This could have skewed the participants' feelings towards being an adjunct.

I could have also attempted to reach out to adjuncts individually, but I had decided to go through chairs so as to have a sort of permission to talk to their adjuncts, or at least give the chairs the heads up that someone was talking to their adjuncts about their experiences. Going through the chairs required them to be willing or proactive enough to forward the recruitment survey to their adjunct corps. Reaching out directly to the adjuncts themselves when possible may have increased recruitment. This, however, would have required adjunct faculty to be listed appropriately on their institutions' websites – some of which I had difficulty even identifying department chairs.

Another large limitation of this study was not only the sample size, but also that the majority of the data was reliant on participant self-reporting. Self-reporting can result in participants misremembering their history, embellishing stories, or even outright lying. Typically, to combat the limitations in self-reported data, there is triangulation that occurs. I attempted to collect syllabi from the participants in the study, but only a few submitted them. Those that were submitted were not really useful in triangulating the data. Adding observations of each of the participants in their current courses would have strengthened the trustworthiness of the data.

Another limitation to consider was the "type" of adjuncts I interviewed. All of my participants identified either as freelancers or career-enders. The majority of the participants were fairly content with their status as adjuncts as they had chosen to go that route in their lives, either because it was a logical path to take after long careers in the sciences or that it worked for their families, allowing them to spend more time with young children, and they continued with the flexibility being an adjunct afforded them. I think the largest weakness was that I did not have the opportunity to interview any aspiring academics – someone who wanted to move into a full-time position eventually. Natasha was the only participant who might have been identified as an aspiring academic, but after more than 10 years as an adjunct, has a pretty jaded view of what a full-time position would be like and her likelihood of obtaining one without a terminal degree. I feel as though the boundaries I set before the recruitment phase severely limited my ability to recruit aspiring academics, especially the requirement that my participants had five or more years of experience as an adjunct. It is possible that someone who is an aspiring academic would not spend five years working as an adjunct, as they would be proactive about landing a full-time position out of graduate school in less than five years. Aspiring academics may have offered a unique perspective, especially in regards to professional development, because they would be eager and willing to do as much as they could to better their chances at landing a full-time position. As it was, the majority of freelancers and career-enders interviewed in this study were fairly apathetic to the professional development offered to them and didn't spend very much time at all focusing on pedagogy, except that which they could research on their own time online. I also did not have the opportunity to interview any

professionals – adjunct who teach "on the side" of another profession. This may have just been a result of time and interest, as many professionals dedicate more effort to their full-time jobs, rather than their adjunct positions.

Suggestions for Future Research

The first step to take in furthering this research would be to expand the pool of participants to include as many perspectives as possible, possibly removing the five year requirement, and looking at the development of skills even in "new" science adjuncts. It would be interesting to also expand the research to include science adjuncts at two-year community colleges, to see if they are offered better opportunities for professional development, and as a result, show a different pattern of development in the pedagogical skills. Community colleges employ up to 70% adjunct instructors, and as a result, sometimes show much more dedication to supporting their adjunct instructors through appropriate professional development programs. Four-year institutions, as the ones focused on in this study, only report on average about 25% of their science faculty as being adjunct or part-time.

Another interesting avenue for continuing this research would be to expand it out to include veteran adjunct teaching in any discipline. The popular news media consistently reports on the "adjunct crisis," and the majority of adjunct faculty focused in these articles are in the humanities. As funding for the humanities in higher education decreases, as do full-time positions, which are typically not being filled as the previous generation of professors retire. This has left a staggering amount of graduates without avenues to enter into academia full-time. They fill their schedules with introductory writing, literature, and media courses, working for several

institutions at one time. Not that this doesn't happen in the sciences, but it is far less common. It would be interesting to see if their development patterns are similar, despite the difference in discipline, and also what professional development opportunities they find valuable.

Concluding Thoughts

This study highlighted the need for more research on adjunct faculty populations. There is so little research that uses the voices of adjunct faculty to answer the questions we so often ask of the adjunct population. It is easy to stick to numbers and surveys to make observations, but some of the nuance gets lost in the data. I interviewed seven individuals, all whom were very passionate about their teaching, all of whom had a motivation for being an adjunct that was fairly different from the narrative of adjunct life that comes out in the popular press. But it is that narrative, of adjuncts scrambling for positions, working for multiple institutions, changing jobs semester by semester, all in the hope of that elusive full-time position, that institutions have focused on, essentially ignoring their adjunct populations because they might not be there next term. And the seven individuals I interviewed were very faithful to their institutions, all but one teaching for more than 10 years. It is time to shift that narrative to include all adjuncts, and meet them where they are in terms of professional development.

Teaching professional development is certainly increasing in higher education, but it has a long way to go, especially at institutions where research is more of a priority. And while this study focused solely on adjunct faculty, it is likely that many of the findings stated and recommendations made throughout this chapter would be

relevant to novice and developing full-time faculty members as well. But again, the key is to not ignore the adjunct faculty when it comes to professional development – it should be equally offered to all instructors at an institution. Even if an adjunct faculty is transient, everyone is best served when teachers are supported and trained, because those skills are transferable to other positions in academia.

Science education in higher education is important so many reasons, both for majors and non-majors. For majors, having a good science teacher may result in a few more students being retained, likely more women and people of color, both to diversify and increase the amount of STEM graduates which are needed in our quickly technologically advancing society. For non-majors, the last formal science course they take in higher education should be with a teacher that makes science relevant and engaging to them, so that when they graduate they have a better appreciation of science. As long as their last science course ever isn't a bad experience, they will continue to find science interesting and continue to be scientifically literate. We want all of our teachers – including our adjunct faculty – who are teaching science in higher education to be the best teachers they can be, and they cannot do that by "being thrown in a classroom" with little to no support.

APPENDICES

APPENDIX A: Novice to Expert Skill Development Model

Adapted from Dreyfus and Dreyfus (1980), by Berliner (2004)

	Novice	Advanced Beginner	Competent	Proficient	Expert
Characteristics	*Applies rules learned in training to guide his/her actions without flexibility. *Works by the book – everything is black and white - sees no grey area when making decisions *No experience with the situations/ environment in which they are expected to perform	*Sees that rules have exceptions in some cases *Can demonstrate marginally acceptable performance *Unable to see the entirety of a new situation (may miss some critical details) *Begin to see recurring situational aspects and can apply these in new situations *Has difficulty sensing what is important and/or handling challenging situations.	*Develops own plans recognizing which situations are important and which can be ignored. *See that general principles apply to a wide range of situations *Able to see their actions in terms of long-range goals or plans *Decisions are based on considerable conscious contemplation of a problem *Develops own rigid, inflexible rule-making, if averse to taking risks, if lacks confidence, or if fearful of losing control.	*Perceives situations in terms of "wholes" rather than in specific "parts" *Uses rules and general principles that are tempered by experience *Replaces rules with situational intuition. * Still deliberates when making decisions.	*Guided by intuition and experience *Reacts flexibly with intuitive practiced, understanding from thousands of hours of reflective performance. *Aware of the context and the needs of those they serve. *Operates from a deep understanding of the total situation *Possesses domain specific knowledge.

APPENDIX B: Recruitment Script – Emails to Department Chairs

Dear (department chair name),

My name is Heather Miceli. I am a doctoral student at the University of Rhode Island and Rhode Island College, in the Joint PhD in Education program. I am also a part-time faculty member at Johnson & Wales University and Roger Williams University teaching science/biology.

Under the advisement of Dr. Kathy Peno, of the Education Department at the University of Rhode Island, the purpose of my research is to better understand how teaching skills develop in adjunct faculty members in the sciences and what professional development opportunities were most influential in the development of those skills. The benefits of this research include information that may help postsecondary administrations to enact policies that better serve their adjunct populations. If you could, please forward this email to any and all part-time adjunct faculty members in your department that may be interested in participating. If they are interested in participating, they would need to fill out a short 5-minute survey to determine if they fit the requirements for the study. Participants need to have been an adjunct faculty member for at least 5 years, have no formal education in the field of Education, and not have K-12 certification

If chosen, participants will be asked to participate in an approximately 90-minute interview, either in person, via phone, or via Skype.

Preliminary participant survey: (Insert link here)

This research has been approved by The University of Rhode Island Institutional Review Board.

Thank you for your participation in and consideration of this research. Please contact me, Heather Miceli, with any questions or concerns.

Sincerely,

Heather Miceli

Cell: 315-345-2777

heather.s.miceli@gmail.com

APPENDIX C: Recruitment Script – Social Media Solicitation

My name is Heather Miceli. I am a doctoral student at the University of Rhode Island and Rhode Island College, in the Joint PhD in Education program. I am also a part-time faculty member at Johnson & Wales University and Roger Williams University teaching science/biology.

Under the advisement of Dr. Kathy Peno, of the Education Department at the University of Rhode Island, the purpose of my research is to better understand how teaching skills develop in adjunct faculty members in the sciences and what professional development opportunities were most influential in the development of those skills. The benefits of this research include information that may help postsecondary administrations to enact policies that better serve their adjunct populations.

If you are an adjunct with five or more years of teaching experience as an adjunct, have no formal education in Education (as a field of study), do not have a K-12 certification and are interested in participating in this study, please fill out the short 5-minute survey linked here to determine if you fit the requirements for the study.

If chosen to be a participant in the study, you will be asked to participate in an approximately 90-minute interview, either in person, via phone, or via Skype.

Preliminary participant survey: (Insert link here)

This research has been approved by The University of Rhode Island Institutional Review Board.

Thank you for your participation in and consideration of this research. Please contact me, Heather Miceli, with any questions or concerns.

Heather Miceli

Heather.s.miceli@gmail.com

315-345-2777

APPENDIX D: Participant Eligibility Survey (through Google Forms)

Thank you for completing this pre-study survey. Your answers here will determine if you are eligible to participate in a study investigating how part-time adjunct faculty develop their pedagogical (teaching) skills.

1. Have you been an adjunct for more than 5 years?
2. What subject(s) do you teach?
    a. Biology
    b. Chemistry
    c. Physics
    d. Other (please list)
3. Do you have a K-12 certification?
4. Do you have a degree earned in the field of Education?
5. Are you a graduate student at the institution for which you teach?
6. Are you available for an approximately 90 minute interview on your experience as an adjunct, learning new teaching skills? This interview can be in-person or remote (via phone or skype)
7. Please include your email address through which I can contact you.

Thank you for your interest.

APPENDIX E: Interview Protocol

Identity

You identify yourself as a male/female/transgender/other?
You identify as _____ racially/ethnically.

Teaching background

What institution(s) do you work for?
In which department(s) do you work?
How long have you been teaching at each institution?
What is your educational background? What are your degrees in and where from?
What courses do you teach?
Do you have union representation?
Why are you an adjunct? What compelled you to take this/these job(s)?
When (in what context) do you feel most satisfied while working?
Describe what you think it means to be an effective teacher.

Show participant Novice to Expert Model

Early Teaching Career

What, if any, graduate support did you have in regards to your teaching?
Tell me the story about your first post-secondary teaching experience as a faculty member.
- What was the course? Setting? How many students? What institution? Types of students?
- How did you approach your teaching? Any particular reason why?
- Can you tell me about a time early on when you felt "spot-on" as a teacher? What did it look like?
- Can you tell me about a time when your teaching "flopped?" What happened? Did it prompt you to change something – how?
- What emotions do you remember feeling?
- How effective did you find your approach? How did you know if your teaching was effective or not?
- Do you think you were effective as a teacher?
- What was the student feedback you received – either through student evaluations, or informal feedback?

Current Teaching

Now, tell me a story about a recent lesson or class that you are currently or have recently taught?
- What was the course? Setting? How many students? What institution? Types of students?
- How did you approach your teaching? Any particular reason why?

Can you tell me about a time more recently when you felt "spot-on" as a teacher? What did it look like? How was it different from early on in your career?

Can you tell me about a more recent time when your teaching "flopped?" What happened? Did it prompt you to change something – how? How was it different from early on in your career?

What emotions do you remember feeling?

How effective did you find your approach? How did you know if your teaching was effective or not?

Do you think you were effective as a teacher?

What was the student feedback you received – either through student evaluations, or informal feedback?

Evolution – Professional development

Have you ever been formally evaluated by your superiors? Observed? Received feedback?

Looking back, how has your teaching changed? What prompted those changes?

What motivated you to develop new skills?

Thinking back,

How did you go about finding resources that helped you learn about new teaching skills?

Who did you talk to?

Describe some of your experiences with professional development

Did you attend workshops provided by an institution?

Did you attend conferences?

Did you research on your own?

Did you have informal conversations with colleagues?

What type(s) of professional development were most influential in helping you change your teaching practices?

What experiences had a negative impact on your development?

Can you describe a time when you wanted to participate in professional development, but couldn't because of some aspect of your adjunct status?

Professional connections

Describe your relationships with your supervisors/department chairs.

Describe your relationships with other adjuncts/other faculty.

What are some of your long-term/short-term personal goals as a teacher?

APPENDIX F: Master List of Themes – Framework for second round of coding

1. How do veteran adjunct faculty, who teach in the natural sciences, describe their teaching?
    a. Relevant and Applicable to the real world
        i. Use real-world examples, current events
        ii. Make sure they are prepared – writing, on-time, no excuses
    b. Personal connections with students
    c. Started teaching Passively
    d. Currently, using more Active learning techniques

2. How do veteran adjunct faculty, who teach in the natural sciences, describe their development of pedagogical skills along the Dreyfus and Dreyfus (1980) Novice to Expert Skill Model?
    a. Not many identified as Novice; Many identified as Advanced beginner when starting
        i. Previous experience
            1. Graduate teaching assistants
            2. Industry
            3. Parents
        ii. Advanced beginner characteristics
    b. Competent
        i. Rigid rules
        ii. What works/what doesn't work
    c. Proficient
    d. Expert
        i. Flexibility
        ii. Aware of the context

3. How do veteran adjunct faculty, who teach in the natural sciences, self-identify their current level of pedagogical skill along the Dreyfus and Dreyfus (1980) Novice to Expert skill model?
    a. Some were reluctant to say Expert
    b. Some said expert, but probably not

4. What do veteran adjunct faculty, who teach in the natural sciences, perceive as factors that provided positive results in their development of higher pedagogical skills?
    a. Relationships with colleagues
        i. Sharing materials
        ii. Informal conversations
        iii. Peer observations
    b. Self-drive
        i. Researching online new ways to teach concepts
        ii. Unusual resources
    c. Funding

        i. Union support for PD
        ii. Asking for money
    d. Seeing the "big picture" – their value to the institution
    e. Trainings and Workshops

5. What do veteran adjunct faculty, who teach in the natural sciences, perceive as factors that provided negative results in their development of higher pedagogical skills?
    a. Very little support
        i. No initial support
        ii. No observations/continuing evaluation
        iii. Mechanical (practical) workshops
    b. Not trained to teach
        i. Very little support as TAs (when applicable)
        ii. Little knowledge of education as a field
        iii. Relying on ineffectual measures of success
            1. Grades
            2. Student Evaluations
    c. Adjunct Pitfalls
        i. Timing of schedule
        ii. Role in department – "second-class citizen"
        iii. Connections to students
        iv. Not knowing support services (PD) offered
        v. Other priorities

APPENDIX G: Issues of Trustworthiness in a Qualitative Study

From Shenton (2004)

The following methods were used to address the issues of trustworthiness:

	Credibility	Transferability	Dependability	Confirmability
In-depth methodological description			X	
Purposive Sampling		X		
Admission of Researcher's Beliefs and Assumptions				X
Dependability Audit (documentation, reflective journal, field notes)			X	
Thick Description of the Phenomenon		X		
Peer Scrutiny using critical friends	X			
Member Checking	X			

APPENDIX H: Findings Summary for Member Checking

The following was sent via email to all participants once data analysis was complete

Research Question #1: How do veteran adjunct faculty, who teach in the natural sciences, describe their teaching?

Three overwhelming themes were found that suggest that veteran adjunct science faculty:

1. make science relevant, through easy to remember analogies, using current events and topics relevant to their students' lives, and in developing critical thinking skills to be used in other aspects of their lives.
2. began teaching passively early in their careers, mostly through lectures, but found over time that it was not enough to engage their students and began using more active teaching techniques.
3. Develop personal connections to their students, despite their part-time status as faculty members.

Research Question #2: How do veteran adjunct faculty, who teach in the natural sciences, describe their development of pedagogical skills along the Dreyfus and Dreyfus (1980) Novice to Expert Skill Model?

One of the most interesting findings of this research was the fact that none of the participants identified as novice teachers when they began teaching as adjuncts. This was mostly in part to some of the participants having prior teaching experience as graduate students, but also some participants cited their experience as parents in helping them to develop past the novice level as a teacher.

As advanced beginners, participants cited examples of times when they "were effective enough" demonstrating marginal performance, but also times when they realized that they were missing crucial aspects of how students learn. Some participants highlighted times during their first experiences where they were flexible and didn't see everything as "black and white" so were clearly beyond the novice stage.

While in the competent stage, participants identified many instances where they felt emotionally responsible for student learning, so they began to describe when certain activities worked, and when others fell flat, but also being able to recognize when the students weren't engaging. They also described times when they imposed rigid, inflexible rules to maintain control in their classrooms.

Participants described being proficient teachers when they began to pull back on their rigid rules and become more flexible. They also described times when they really think deeply about the pedagogical decisions they make and which ones best serve their students, flexibly changing their approach, even mid semester. Several participants also made mention of having to deliberate over decisions as well.

Participants did identify as being experts, who showed the ability to react flexibly in the classroom, sometimes scrapping plans in a class when it was clear the students didn't understand some content or when something was going poorly. Expert teachers were also described as having a very good understanding of who their students' were and the needs of their students, sometimes tailoring a class to focus more on a particular major that was common. Expert teachers also had a very good sense of their shortcomings and how to account for those – incorporating videos and guest lecturers to cover topics that they weren't familiar with, and also researching ways to cover topics in ways that downplay their own personal weaknesses as instructors.

Research Question #3: How do veteran adjunct faculty, who teach in the natural sciences, self-identify their current level of pedagogical skill along the Dreyfus and Dreyfus (1980) Novice to Expert skill model?

All participants identified at the proficient or expert level. One interesting finding was that most of the women participants were reluctant to respond with expert level.

Research Question #4: What do veteran adjunct faculty, who teach in the natural sciences, perceive as factors that provided positive results in their development of higher pedagogical skills?

Participants identified several factors that provided positive results in their development of higher pedagogical skills, they are:

1. Developing peer relationships – sharing course materials and equipment, striking up informal conversations, and participating in peer observations
2. Self-Drive: Individual Professional development – research teaching strategies and approaches using the internet (so they don't "reinvent the wheel") and using unusual resources (local libraries, previous positions, children's school activities that were modified, etc).
3. Funding – professional development funds through collective bargaining agreements, appealing/advocating for funding, grant-funded professional development opportunities – all allowed the participants to further their teaching skills.
4. Workshops/conferences – a few participants mentioned attending trainings and how they helped develop their skills.
5. "Seeing the Big Picture" – A few participants made mention of how being a part of the larger university culture has or could help them understand their students better, like participating in curriculum development or being able to advise students.

Research Question #5: What do veteran adjunct faculty, who teach in the natural sciences, perceive as factors that provided negative results in their development of higher pedagogical skills?

Participants also identified several factors that produced negative results in their development. They include:

1. A lack of teaching support – including
    a. "being thrown in the classroom" as graduate students, but also as new instructors, with very little guidance given
    b. spotty observations by superiors, as some of the participants indicated that they had never been observed by a superior, or if they had, it wasn't very useful
    c. mechanical and forgettable trainings/workshops, many of the participants indicated they had participated in formal professional development, but found that it was more mechanical (how to use a learning management system) versus being more pedagogical; some even indicated that they couldn't remember what their trainings were about.
    d. A few of the participants indicated the fact that they were not formally trained in education as having a negative impact
2. Common Adjunct pitfalls
    a. Timing of their schedules – little interactions with others (which they valued a lot), not compatible with professional development opportunities.
    b. Being treated as "second-class citizens" – difficulties developing relationships with full-time faculty, knowing they are dispensable, no office space.

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